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Director General of Medical Department,

Imperial Japanese Navy.

THE
SURGICAL & MEDICAL HISTORY
OF THE
NAVAL WAR BETWEEN JAPAN & CHINA
DURING
1894—95.

Y. Saneyoshi, F.R.C.S. Eng., &c.,

DIRECTOR GENERAL OF MEDICAL DEPARTMENT, IMPERIAL JAPANESE NAVY.

THE

SURGICAL & MEDICAL HISTORY

OF THE

NAVAL WAR BETWEEN JAPAN & CHINA

DURING

1894—95.

TRANSLATED
FROM THE ORIGINAL JAPANESE REPORT,
UNDER THE DIRECTION OF
BARON SANEYOSHI,
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PREFACE.

We consider it our duty to the Medical Profession to publish the accompanying record of casualties and sanitary conditions in the war between China and Japan (July 1894—November 1895). Much has been written about the wounds received in wars on land, indeed the Medical and Surgical History of the American Civil War is full of interest and information. Of naval warfare we possess no medical history: the lessons of Trafalgar and Lissa, and war between Chile and Peru have been lost to us, and there has been no previous experience of the treatment of the wounded on ships since the modern revolution in naval warfare.

Our ships were, as a rule, considerably injured in the battle of the Yellow Sea, 17 Sept. 1894, and our surgeons during and after that battle were so busily occupied with the treatment of the wounded that they found little time for keeping accurate clinical records. However, in June 1895, a circular was issued by the Naval Department to the Surgeons in charge of Ships, Naval Barracks, and Hospitals asking for detailed replies to a carefully elaborated set of questions as to wounds, diseases and general sanitary conditions during the war.

In addition to the replies thus obtained from our Surgeons we have used the following documents in the compilation of this book :

Sick Lists.
Clinical Records.
Monthly Reports of Force.
Billets of Wounded.
Certificates of Death.
Reports on the Effects of Shells received.
Daily Sick-Reports.
Monthly Sick-Reports.
Quarterly Reports of Clinical Experience.
Certificates of Wounded.
Periodical Reports of Observations made by our Surgeons.
Occasional Reports of Observations made by our Surgeons.

August, 1901.

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Figure of the fore part on the lower deck of the Matsushima, showing the state of explosion of a shell.

Figure of the lower deck of the Hiyei, showing the explosion of a shell in the surgery (the wardroom).

ERRATA.

PAGE 70, line 22, for " 13th " *read* " **30th.**"

„ 120, line 12, for " perforated wound " *read* " **penetrating and perforated wounds.**"

„ 161, line 2, for " be " *read* " **he.**"

„ 206, line 15, for " epdmrieis " *read* " **epidermis.**"

„ 272, line 16, for " contused wounds " *read* " **contusions.**"

„ 291, line 27, for " contusion " *read* " **contused wound.**"

„ 341, line 13, for " penetrating " *read* " **perforating.**"

INTRODUCTION.

In the Japan-China War during 1894—5, the naval battles of Phung-do and Yalû, the attacks of the Japanese upon Tan-chow, Wei-hai-wei, the Pescadores, and those upon Keelung, Takau, and Anping in Formosa were the principal engagements ; our bombardments of Hwa-yuan-kow, Talien Bay, Port Arthur, and Yingching Bay may be also reckoned as sea-fights of importance. The description of the general conditions of the war, that is, the force and movements of our squadron and those of the Chinese fleet &c., naturally belong to other public documents, and do not come within the scope of this history. Only a few remarks will be made therefore, with regard to the general engagements themselves : the condition of the killed and wounded in the various actions and diseases and injuries in general will alone be fully described in the book.

THE SURGICAL AND MEDICAL HISTORY OF THE NAVAL WAR BETWEEN JAPAN AND CHINA.

CHAPTER I.

BATTLES AND INJURIES.

1.—THE NAVAL BATTLE AT PHUNG-DO.

On the 25th of July, 1894, our First Flying Squadron consisting of the men-of-war Yoshino, Naniwa, and Akitsushima fought against the Tsi-yuen, Kwang-yi, Tsao-kiang, and a transport of the Chinese fleet on the sea of Phung-do. This was the first naval battle fought between the two nations, and our squadron defeated the enemy's fleet at one stroke.

During this action, a shell discharged from the Chinese fleet struck the Yoshino on her starboard at 9 o'clock a.m., crushed the middle part of the fore gaff (about 20 metres above the sea level) and passed off toward the port side.

At half-past 9, a 15 centimetre shell discharged from the Tsi-yuen, perforated the fore part of the left side of a pinnace situated on the middle booms, (about 7 metres about the sea level), it also destroyed a boat and timbers placed on the deck house ; then it passed downward perforating the ceiling of the dynamo-room in the middle of the upper deck, and broke the left end of a cylinder in that room ; then, after striking the left part of the back wall of the room, it fell into the engine room, where it stopped without exploding. No one was either killed or injured by it.

At half-past 7, a shell of about 12 centimetres perforated the after part of the port side of the Naniwa, at a point about 1.6 metres above the sea level, destroying the officer's scullery, a beam and a deck-stronger; then penetrating the scullery of the gun room, and the wall between the lieutenant rooms, passed forwards and upwards, perforating the steel-deck at the left side of the after battery; at this place it destroyed an arm of a kedge-anchor, a derrick, the posterior wall of the magazine below the after bridge, and a morning hose pipe; and finally passed away without bursting, no one being killed or injured by it.

During this battle, three men of the Yoshino had their membrana tympani perforated by the vibration of air caused by the discharge of their gun. Three men of the Naniwa received slight burns from the gas produced by the discharge of their gun.

2.—THE BATTLE OF YARÛ.

It was on the 17th of September, 1894, that the Japanese Combined Squadron composed of the Principal Squadron which comprised the Matsushima, Itsukushima, Hashidate, Fusō, Chiyoda and Hiyei; the First Flying Squadron comprising the Yoshino, Naniwa, Takachiho, Akitsushima, and the gun-boat Akagi, with the ex-merchant steamer Saikyō-maru transformed into a cruiser for the time being, fought a decisive battle on the Haiyang sea against the Chinese fleet, consisting of the Ting Yuen, Chen Yuen, King Yuen, Lai Yuen, Ching Yuen, Chih Yuen, Ping Yuen, Tsi Yuen, Yang Wei, Chao Yang, Kwang Chia, Kwan Ping, and a few torpedo-boats. The battle commenced at 12.50 p.m. and grew hotter and hotter until the climax was reached between 2 p.m. and 3 p.m. By that time most of the warships of the Chinese fleet had been either sunk or burned under our furious bombardment and the remainder had retired to a place of safety. The complement of each warship of our Squadron engaged in this battle is given in the following table.

SHIPS.	COMBATANT OFFICERS.	ENGINEERS.	SURGEONS.	PAY-MASTERS.	SEAMEN.	STOKERS.	MEDICAL ATTEND-ANTS.	PAYMASTER'S ASSISTANTS.	TOTAL.
Matsushima	31	10	4	4	277	74	3	22	425
Itsukushima	24	9	3	2	229	74	3	18	362
Hashidate	24	9	3	2	229	74	3	18	362
Fusō...	22	7	2	2	232	67	3	18	353
Chiyoda	20	7	2	2	185	76	3	18	313
Hiyei	19	6	2	2	214	45	3	17	308
Yoshino	26	11	2	3	251	101	3	22	419
Naniwa	22	9	2	2	224	78	3	18	358
Takachiho	23	9	2	2	224	78	3	18	359
Akitsushima	22	8	2	2	180	85	3	18	320
Akagi	7	4	1	2	81	25	1	8	129
Saikyō-maru	11	4	1	1	49	41	3	8	118
Total	251	93	26	26	2,375	818	34	203	3,826

In this battle our warships received more than one hundred shells in various parts, and two hundred and ninety eight persons were either killed or injured. A naval battle is a very formidable thing, much more so than a land fight; for it consists of either firing big guns, ramming, or the discharge of fish-torpedoes, by which a whole ship may suddenly be destroyed or sunk, even when it is simply hit by shells without exploding. Ships' planks, furniture &c., are destroyed, and many lives are lost, or injuries sustained from the flying splinters. When the shells explode, fearful damage results. Occasionally ships hit by shells escape without injury to life, but this depends upon the part of the ships hit. In this battle our ships fortunately escaped total destruction though the damage done to each ship was severe, especially on the Matsushima where the bursting of a shell caused the explosion of the ammunition.

The following table shows the number of shells which hit our ships and the number of killed and wounded.

SHIPS.	SHELLS HIT.	KILLED.	INJURED.	TOTAL OF KILLED AND INJURED.
Matsushima	13	35	78	113
Itsukushima	8	13	18	31
Hashidate	11	3	10	13
Fusō	8	2	12	14
Chiyoda	3	...	...	...
Hiyei	23	19	37	56
Yoshino	8	1	11	12
Naniwa	9	...	2	2
Takachiho	5	1	2	3
Akitsushima	4	5	10	15
Akagi	30	11	17	28
Saikyō-maru	12	...	11	11
Total	134	90	208	298

The column of "killed" in this table means those who died immediately. It is the same in the following tables.

The column of "shells hit" in this table denotes the marked damages by shells which have been reported by the surgeons on board warships. Hence those damages which left slight marks, or none are not calculated

The details of the course of shells, of the damages sustained by the ships, and of deaths or injuries among the ships companies mentioned in the above table will be fully described in the following articles.

The Matsushima. 1.—At 12.55 p.m., a shell of about 15 c.m. hit the upper border of the turret of the 32 c.m. gun on the after part of the upper deck and exploded ; a part of its fragments destroyed the after-wall of the captain's cabin, and the search-light, other pieces entered into the turret, tore the hydraulic tube and crushed the rails on the turret, the splinters of the rails cut off five signal halyards and wounded a man. At this moment Commander S. Mukoyama on the after bridge was wounded slightly by a piece of the shell.

2.—At 1.20 p.m. a shell of about 15 c.m. exploded against the gun-mounting of the starboard seventh Hotchkiss' light quick-firing gun, (7.8 metres above the sea level) in the middle part of the flying deck and carried off the gun and shield ; the fragments of the shell, and gun-mounting tore the deck and destroyed the search-light of the after part, the lower portion of the main mast, and the sky-lights. By these fragments two men of the Hotchkiss' were killed and two were wounded.

3.—At 1.25 p.m., a 47 millimetre shell perforated, at a point of 4 metres above the sea level, the lavatory of the admiral's cabin which stands on the starboard side of the lower deck at the stern, and passing obliquely through the flag-captain's cabin, destroyed the chest before the cabin, and fell near the entrance of the after magazine. As it did not explode, no casualty occurred. About the same time, Flag Lieutenant Shimamura who was on the fore bridge received a slight injury from a small piece of shell.

4.—At 2.30 p.m., a shell of about 15 centimetres perforated the right side of the funnel at a point of 10.5 metres above sea level.

5.—At 2.34 p.m., a 26 centimetre shell discharged from the Ping Yuen perforated, at a point of 3.6 metres above the sea level, the mess-room on the port side of the middle part of the lower deck where the surgeons were stationed, destroying more than half the medicinal articles ; then the shell perforated the torpedo magazine and passing beneath the torpedo discharger, crushed the side plate at the entrance to the engine room. Lastly it struck against the gun-mounting of the 32 centimetres and tore it to pieces (without exploding,) damaging stores, oil-tanks, and medicine-chests. By the scattering of the fragments of the iron plate, the beams above the torpedo-discharger, the rails for the torpedo, a fish-torpedo (a part of the body being perforated without explosion), the scullery, lavatory, bath room, a part of the gun-room water-closet, and the surrounding parts of the lower deck were destroyed. At this time, Sub-Lieutenant A. Ide who was directing the torpedo was thrown down by the passing force of the shell; he was also injured by a piece of the iron plate, three of the torpedo crew were killed by the shell, and four men were more or less wounded by the iron and wooden splinters.

6.—At 2.42 p.m., a 37 millimetre shell perforated the engineer's room on the port side of the middle part of the lower deck, at a point of 4.5 metres above the sea level, and exploded against the mounting of the 32 centimetre gun, but no marked damage was sustained.

7.—At 3.10 p.m., a 47 millimetre shell perforated the torpedo-chamber on the port side of the middle part of the lower deck, and exploded against the shell-mounting under the main mast. At this time, a torpedo man was severely wounded.

8.—At 3.26 p.m., two 30.5 centimetre shells simultaneously struck at a point of about 4.5 metres above the sea level, No. 4 battery of 12 centimetre gun on the port side of the fore part of the lower deck. The one struck the gun obliquely and changed its direction a little upwards, perforated the upper deck on the starboard side and passed through the netting on the same side. The other one exploded against the shield, igniting the ammunition placed around the 12 c.m. guns on each side, especially that which was piled up at the entrance of the magazine. These explosions smashed gun gears, trunks, chests, etc. and caused a fire among the fragments of wood and canvas which were scattered about. The shell then destroyed electric cells, and wires, and the ladder in the fore torpedo-chamber ; it also broke the iron-cover of a sheet chain locker under the ladder, and depressed the doors of the lockers on both sides of the torpedo-chamber, and damaged their contents. As the lower deck upon both sides of the water-tank was destroyed and fell on the tank, more than half the wash tubs arranged on it, and the windlass were destroyed; the ladder of forward hatch No. 1 was blown off; the steam pipe and voice tube were cut off, while the iron plates surrounding the entrance of the fore-boiler were depressed. Further, the gun-room and opposite mess-room were damaged in several places, and cracks and irregularities were produced on the upper and lower decks forwards, especially on the starboard side of the upper deck. The warrant officers' room, their bed rooms and bath room were also destroyed by the bursting of a shell, the sick berths in the fore-part of upper deck being damaged, and the medical stock provided there almost entirely destroyed. Moreover the forward search lights were destroyed and the forecastle and adjacent parts greatly damaged.

During this engagement, many officers and men on board the Matsushima were either killed or injured, some by the fragments of the enemies' shells, some by the explosions of our own gunpowder, some by splinters of ship's planks and tools. In this way thirty persons were killed on the spot while seventy persons were wounded.

PERSONS KILLED ON THE SPOT:

In the neighbourhood of the fore battery of the lower deck ;

Lieutenant K. Shima.

Sub-Lieutenant M. Itō.

First class petty officer Y. Shigeta.

At the starboard battery of the fore part on the lower deck;

Ten men ; and, at the port battery, four men.

Under No. 1 hatch on the fore part of the lower deck;

Two band men stationed there as ambulance men.

Near the magazine on the fore part of the lower deck ;

One seaman.

At the entrance of the magazine on the fore part of the lower deck;

Eight seamen, acting as ammunition suppliers.

Two seamen were killed by a violent shock of explosion while undergoing surgical treatment in the temporary surgery on the fore part of the upper deck.

PERSONS INJURED:

Near the fore battery on the fore part of the lower deck ;

Midshipman K. Ōishi.

At the port battery on the fore part of the lower deck ;

Sixteen men.

At the starboard battery on the fore part of the lower deck ;

Seven men.

At the magazine on the fore part of the lower deck ;

Eleven seamen acting as ammunition suppliers.

At the fore part of the lower deck;

Three band-men and one paymaster's assistant on ambulance duty; two seamen; three carpenters stationed there for fire-brigade work.

At the upper part of the fore-engine room;

One stoker.

At the torpedo-room of the fore part;

Three torpedo men.

At the torpedo-room on the starboard side amidships;

Sub-Lieutenant A. Ide (twice wounded), and two torpedo men.

In the neighbourhood of the torpedo-room amidships;

One carpenter acting as fire-brigade man.

At midships on the lower deck;

Two seamen.

In front of the gun-room on lower deck;

Sub-Lieutenant C. Sasaoka acting as the lower deck mate.

At the fore part of the upper deck;

Warrant officer M. Okubora; three band men on ambulance duty, one black smith stationed as fire-brigade man.

At the hospital on the fore part of the upper deck;

Deputy Inspector General H. Kawamura; one petty officer, and one paymaster's assistant, acting as hospital mates.

In the warrant officers' room on the fore part of the upper deck;

One clerk in the staff service.

In front of conning tower;

A signal man.

At the starboard battery on the fore part of the upper deck;

One seaman.

At the entrance of the first hatch on the fore part of the upper deck;

Two seamen acting as ammunition carriers and a signal man.

On the steps of the first hatch;

A cook.

9.—The top of mast was damaged slightly by a shell.

10.—The coffer-dam on the starboard side was perforated by a shell.

11.—The lower part of the main mast was perforated by a shell.

12.—The launch and gig were damaged by a shell.

Of the ships comprising our squadron, the Matsushima was the most seriously damaged, the number of deaths and injuries on board her amounting to over one-fourth of her complement and one-third of the total force of the squadron. The subjoined report will show how hard the medical staff of the Matsushima were put to it, to perform their duty under these trying circumstances.

Report of medical service on board the Matsushima during the engagement in the Yalû sea by Surgeon M. Kusano :—

At 4.57 p.m., on September 16th, 1894, six warships of the principal squadron, four of the first flying squadron, the gun-boat Akagi and a transport Saikyō-maru left Taidon bay, Korea, for the island of Haiyang, China, forming a line ahead. Early on the 17th, they arrived at their destination and ordered the Akagi to reconnoitre the inlets of Haiyang. After a short time, the gun-boat signalled " No enemy's ship visible," and the fleet proceeded towards Takooshan. At half past 10 a.m., they observed, in the distance, streaks of thick smoke arising above the sea level, and concluded that this indicated the position of the enemy, as they approached, the volume of smoke increased tremendously, and now being certain that this smoke proceeded from the enemy's fleet, the excitement and enthusiasm of the sailors were boundless. The midday meal was partaken of earlier than usual and as soon as they had finished, the command " prepare for action " was given, each one taking up his respective post.

I prepared myself a temporary hospital in the gun-room on the port side of the lower deck and waited to receive the wounded with Assistant Paymaster Takei and medical attendants as help-mates.

About fifty minutes past noon, the battle commenced, the bombardment on both sides growing gradually more and more violent, and a furious rain of shells from the enemy fell on all sides. On the upper deck, a 15 c.m. shell exploded against the turret of our 32 c.m. gun, and one of the gunners was injured by the flying pieces at 55 minutes past noon ; at 1.20 p.m. a shell bursting against No. seventh light Hotchkiss' gun destroyed the gun, and two persons were killed, and two injured by pieces of the shell. About 2.34 p.m., I went out to give instructions for carrying the wounded ; I crossed the deck to the starboard gun room just opposite the temporary hospital and at this instant, a rumbling noise, and a violent shock suddenly arose, and I knew that some shells had struck our vessel ; going back immediately to the hospital I discovered that exactly where I had been standing a moment before had been obliquely perforated by a 26 c.m. shell discharged from the Chinese ship Ping Yuen. The greater part of surgical articles were destroyed by this shell and the rest were scattered here and there. As work in the hospital under such circumstances, was impossible, I tried to prepare a hospital in a gun-room on the starboard side or in the staff officers' cabin, on the after part ; but the majority of medicines and surgical instruments having been either damaged or lost, I thought it better to transfer myself to the hospital on the upper deck, and informed the officers of the battery on the lower deck of my purpose ; accordingly Assistant Paymaster Takei, and others and myself reported the state of damage to Dr. Kawamura, Surgeon-General of the Squadron, and Dr. Ogisawa, Chief Surgeon of the ship. About 3.30 p.m., as I was occupied in assisting Chief Surgeon Ogisawa to treat a case of mutilation of limb, and Surgeon-General Kawamura was treating a case of mutilated wound of the abdominal wall with Assistant Surgeon Abe, two 30.5 c.m. shells struck the ship, at the same time, one of them exploded with tremendous force against the shield of 12 c.m. gun of No. 4 on the port side of the fore part of the lower deck, where the temporary hospital was stationed ; the deck was torn up and the gas produced by the explosion filled all around, so that nothing could be seen, and one could only hear an indescribable cry, and tremendous sound. Two severely wounded persons who were just under treatment in the hospital died from the shock, I was momentarily stunned and had a peculiar feeling as if the ship was sinking. Thinking that all the officers would be standing on the after deck according to their ranks, waiting an honorable death, I determined to die with them ; but was nearly suffocated while endeavouring to reach the deck, besides stumbling over articles scattered all about, but finding the fore deck also filled with thick gas and blinding all around, I proceeded along the first hatch toward the after part of the starboard side and narrowly escaped falling down to the lower deck, as there was a gap produced by the perforation of 30.5 c.m. shell on the starboard side, which one was unable to see owing to the gas; when I reached the back part of the officers' kitchen, the clouding smoke cleared off gradually and I discovered that our ship was navigating as usual, but a great many persons with burns came to the officers' room and captain's cabin, some walking and some being helped by others. As these burns were severe, the cries and groans were pitiable. Surgeon-General Kawamura was laid on a bench in the officers' room with a spinal concussion and contusion of the ankle joints but fortunately Chief-Surgeon Ogisawa, Assistant-Surgeon Abe, and the medical attendants were safe. As the medicines and surgical instruments were scattered here and there in disorder by the destruction of the hospital, and finding that the greater number of the wounded were cases of burns, I determined to substitute oil for the engines for dressing the burns, and after consulting the chief-engineer, "*Shirashime oil*" was brought and used for dressing. It was no easy matter even to perform a temporary dressing for such numerous cases, yet we finished it with the assistance of Paymaster Fujita, who was occupying the position of Secretary of the Standing Squadron. Not only the admiral's cabin, the captain's cabin, and wardroom, but also their bed rooms were filled with the wounded, numbering above sixty; the majority having burns on their whole bodies, and the cries and moans were beyond description. The total number of killed was thirty five, from a large shell of the Chinese man-of-war Chen Yuen, which exploded against our gun shield. As a result the ammunition for side guns heaped up on the lower deck, ignited, Lieutenant Shima, Sub-Lieutenant Itō, Midshipman Ōishi, the gunners, and crew of the side guns on both sides, magazine men, and carriers of wounded amounting to one hundred in number were either killed or wounded from it.

Preceding the above accident, a shell from the Ping Yuen passed the bottom of the torpedo-discharger on the port side, perforating a torpedo-officer's room, an iron plate on the entrance of the after engine room and oil tank, after striking the hospital on the lower deck; then it burst against the gun-mounting of 32 c.m., some pieces of the shell destroyed one of the medicine chests on the starboard side of the battery. As our ship received such severe damages and nearly lost its fighting power, it was ordered to return home for repairs and Admiral Itō with his staff officers removed on board the Hashidate in the evening, and our ship turned its course towards home. On the

18th, a temporary hospital was established in the captain's cabin, and the medicines and instruments, which were scattered about and undamaged were collected, but as there was not enough, cotton was used for lint; lime stored for ship's use and *shira-shime oil* for engines were used to make a liniment, brandy for the officers' table was given to patients ; clothes of officers and men were also given to patients. Not only such important medicines, as anodynes and stimulants, were wanting, but the dispensing apparatus were nearly destroyed, so that under these circumstances, patients were moaning with agony everywhere, and being so numerous, were obliged to wait a very long time before their turn for the dressing of their wounds arrived, although we did our utmost to console them. We ourselves had no leisure time to take regular meals, and contented ourselves by sipping condensed milk. Even working so hard, it took us from 7 a.m. till 10 p.m., to get through with dressing their wounds. Ten of the persons severely burned died on the 18th, five on the 19th, and three on the 20th, making eighteen in all. But owing to the numerous patients with burns remaining, we could not sleep even for a short time at night, and this deficiency of sleep, and poor supply of food so fatigued us that we were only able to perform our services by taking stimulants. We got a very great help from the bandmen, who assisted the medical attendants, and lightened more or less their work by watching the patients.

On the 19th, the dressings and medicines were diminishing, and we found they would not hold out much longer ; although we expected to reach Port Sasebo on the next day, yet it was uncertain, as the change of weather and severe damage of the ship might cause delay, so we economized the consumption of medicines as much as possible. As we anticipated, about midnight some derangement occurred to the engine and only the half side of the engine could be used. The speed decreased to half and an adverse wind with high sea made it still worse. Every time the wind raged, sea water overflowed on both sides through the damaged holes. The patients who were complaining at not arriving at their destination as soon as they expected, were discouraged by perceiving the death of their comrades; it was difficult for us to conceal it from them and we could not help shedding tears. On the 20th, when we observed the top of the mountain ranges in Hizen Province, the wind and waves got calmer and the speed increased again. All persons on board the ship now felt more easy and the patients were encouraged by hearing Port Sasebo was near at hand. Approaching the port, a short time after, signals were made for signal stations in Hejiki (Hirato island) and Cape Kogosaki, by which preparations and arrangements for litters, porters, and boats for patients, were requested of the Sasebo naval hospital.

As soon as anchor was cast in Sasebo port, surgeons of the hospital came on board the ship immediately with litters, and boats with medical attendants. Those who were injured slightly and could walk were sent to the hospital first, and those injured severely were carried under complete protection to the hospital by litters. Thus we finished our responsibility at 1 a.m. of the 21st.

The Itsukushima. 1.—At 1 p.m., a 21 c.m. shell struck a boom of torpedo netting, on the fore part of the starboard side, at the point of 3 metres above sea level and exploded, making a hole about 1.3 m. on the side and entering the torpedo room, damaged a part of the racer and weston tackle; and here the pieces of shell were scattered in all directions; the two large pieces making a hole of about 300 m.m. on the port side, and the other pieces killing eight men and wounding three.

2.—At 1.05 p.m., a 15 c.m. shell perforated the coal bunkers in midship of the starboard side, at the point of 600 m. m. above sea level; it passed between the hatch way of the fore engine room, and the aft boiler room, making a hole of 3.3 m. by 0.47 m. in the iron septum between two rooms, and destroyed a ladder between the middle step of the aft boiler room and the mid-deck, and here the shell exploded; the pieces of it dispersing in all directions, made two small holes in a fresh water tube used for the ten ton pump in the fore boiler room; two holes in the iron door closing the boiler room, and a small hole in the steam pipe of the ventilator for the aft boiler; they also destroyed a frame of the ventilator, and crushed the spindles for the sluice valve in the bottom, between the fore and aft engine room; besides the gratings of the upper and middle step of the aft boiler room, and the middle step of the fore engine, and boiler room were slightly damaged. A stoker in the aft boiler room was killed and Assistant Engineer Matsuzawa injured.

3.—At 1.20 p. m., a 15 c. m. shell perforated the main mast from the starboard side at the point of 6 metres above the upper deck, and cut off the voice tube, the cable of the distant director, and the chain of the ammunition lift, and perforated the funnel of the port steam launch, finally falling into the sea without injuring any one.

4.—A 50 m.m. shell perforated the admiral's bed room in the stern, from the starboard side, at a point 6 metres above sea level, and exploded against a marble table. The pieces of shell scattering destroyed the door of the room and three chairs on the port side, after piercing the wall of the room. No one was either killed or injured by this shell. Time not precisely known.

5.—At another time, a ten centimetre shell perforated obliquely the starboard pinnace and first gig, and entered the wardroom galley on the midship of the upper deck, and burst (not exploded) here, perforating the iron septum, and passed through to the gun-room galley, here also perforating the iron septum. Then it entered the baking room severing the entrance door from within, and finished its course by the door of the men's water closet on the port side. No injury.

6.—At 3 p.m., a 50 m.m. shell struck the midship of the starboard side at a point about three metres above sea level, and perforated the aft coal shoot, lodging eventually in a starboard coal bunker.

7.—At 3.20 p.m., a 50 m.m. shell discharged from the Ping Yuen exploded through the upper part of a port scuttle on the fore part of the middle deck, and ignited the clothes' shelves on the port side of the mess-deck ; but it was immediately put out, and no injury occurred.

8.—At 3.30 p.m., a 50 m.m. shell exploded through the port netting on the fore part of the upper deck at a point 6.5 metres above sea level, and took fire. The pieces of shell, striking the turret of a 32 c.m. gun, dispersed, and killed two stokers on the grating of the highest part of the fore boiler room, and two men on the fore part of the upper deck, and injured five men.

Besides the above mentioned casualties, four men on the starboard Hotchkiss' battery on the highest deck and one man on the upper deck had their membrana tympani ruptured by violent shocks from big guns discharged on the lower deck.

The Hashidate. 1.—At 1.10 p.m., a 15 c.m. shell entered the turret destroying the upper part of the right side of a 32 c. m. gun on the fore part of the upper deck, at a point 6.7 metres above sea level, and exploded against the centre of the inner surface of the turret-vault. The fragments damaged the inner surface of the turret, but the thickness of the turret being 300 m.m. the damage was very slight; and the gun, hydraulic machine, and gun mounting were uninjured. Lieutenant Y. Takahashi, who was directing the gunners, Lieutenant K. Senokuchi, and a gunner, were killed in the turret; and four men in the turret, and five on the port side of the fore part of the upper deck were wounded.

2.—At 2 p.m., a 15 c.m. shell perforated the starboard midship of the lower deck, at a point 2.3 metres above sea level, and exploded against the iron plate, between a store room and a coal bunker. A part of the shattered shell lodged in a coffer-dam in the coal bunker, the other pieces lodging on a clothes' shelf, after having destroyed a part of a chest of drawers in an engineer's room. No one was killed or injured.

3.—At a time not ascertained, a 15 c.m. shell perforated the outer plating below the port of No. 9 starboard gun on the stern, at a point one metre above sea level, and lodged, without bursting, in the coffer-dam.

4.—At a time not ascertained, a 47 m.m. shell exploded against the outer plating of the starboard waist, at a point 1.05 metres above sea level. Its pieces destroyed the brim of No. 5 coaling hole, the starboard ladder, the booms for the torpedo-net, and the torpedo-net itself.

5.—At a time not ascertained, a 47 m.m. steel shell passed through the right side of a fire casing, at a point 7.5 metres above the sea level, and simply fell down upon the boiler without exploding. No casualty.

6.—At a time not ascertained, a 47 m.m. steel shell perforated the iron cover of the funnel hanging on the right side of the fire casing, but, as it lodged without exploding, it caused no injury.

7.—At a time not ascertained, a 37 m.m. steel shell stopped in a hammock, perforating beneath the starboard hammock netting on the upper deck under the bridge, at a point 6.7 metres above sea level.

8.—At a time not ascertained, a 57 m.m. steel shell cut off the chains of the midships stockade of the starboard side at a point 6.1 metres above the sea level. It also destroyed a pinnace and dingy, and stopped at the lower portion of the door, leading to the officer's galley without explosion. No case of killed or injured.

9.—At a time not ascertained, a 57 m.m. shell penetrated the starboard midship, at a point 7.58 metres above the sea level, and passing through a whaler and a barge, fell into the sea without explosion.

10.—At a time not ascertained, a 37 m.m. steel shell, at a point of 6.7 metres above sea level, exploded against the lower portion of an awning stanchion outside the starboard hammock netting on the upper deck below the bridge; the pieces of the shell fell into the water without causing any casualty.

11.—At a time not ascertained, a 47 m.m. steel shell came from the starboard side and fell into the water on the port side perforating the middle of the flag hoisted on the maingaff.

Besides the above mentioned, a man who was serving with the

Hotchkiss' gun had his membrana tympani ruptured by the shock of a gun fired on the poop deck.

The Fusō. 1.—At 3.50 p.m., a 30.5 c.m. steel shell (?) struck against the stern on the port side, at a point 1 metre above the sea level, leaving a round hole of 320 m.m.; destroyed the commander's cabin, perforated the lower part of the wall in the cabin, and crushed the fresh water pipe leading to the captain's galley, also severing the wall between a torpedo officer's and a lieutenant's cabins. It then passed across toward the starboard side and entered the wardroom, crushing the tables and chairs, and damaging an iron pillar, two arm racks, and three walls in the room, again, flying up obliquely, it destroyed the wall between the chief navigating and gunnery lieutenants' rooms in the middle deck of the port side. Lastly it flew off, perforating the starboard side near the navigator's room and leaving a hole of 1.28 x 0.65 m. No casualty.

2.—At a time not ascertained, a 30.5 c.m. shell exploded, falling into the sea near the starboard side of the bow and its fragments rebounding perforated the lower part of No. 2 scuttle on the starboard bow, at a point 1.32 m. above the sea level, thus making a round hole, which measured 180 m.m. in diameter, on the starboard side near the upper portion of the middle deck (mess-deck); finally, it stopped at the water way. No case of killed or injured occurred.

3.—At 1.24 p.m., a 7.5 c.m. steel shell perforated the water way on the upper deck midships, starboard, at a point 4.55 m. above the sea level, and made a round hole of 65 m.m. on the outer plating, and an oblong hole of 80 m.m. on the inner plating. It then exploded against the booms and an iron pillar on the port side. Fragments of the shell and other splinters wounded two men on the 3rd 7.5 c.m. gun battery and Sub-Lieutenant Uchizaki on the port battery of the upper deck. Another fragment struck the semaphore signal staff on the fore bridge and fell on to the bridge itself, injuring Sub-Lieutenant Maruhashi who was standing there.

4.—At 2.31 p.m., a 30.5 c.m. steel shell (?) came from the starboard side, bending a portion of the rail for raising ashes on the upper deck, and, after perforating the lower part of the funnel, and the bulwark in front of the 17 c.m. gun on the port side with holes of 0.40 m. and 1.2×0.57 m. in diameter respectively, flew off on the port side. At this time, two men were killed by the fragments of funnel, and eight men were wounded. Most of them were lying on the left side of the funnel, when the order was given to stop firing the guns.

5.—At a time not ascertained, a 17 c.m. shell perforated, from right to left, the middle part of a ventilator behind the funnel on the upper deck, and made a round hole. It also destroyed the fore portion of the keel of a gig, the left arms of the booms, and a portion of the netting on the side of the 2nd 7.5 c.m. gun, and exploded on the port side. No casualty.

6.—At a time not ascertained, a shell burst against the middle portion of the after davit of a galley on the starboard midship, that is, 300 m.m. above the netting, and burned a hammock.

7.—At a time not ascertained, a 15 c.m. steel shell perforated the port netting on the side of the foremost davit of 2nd cutter on the port stern, outwards and downwards, making a hole of 1.8 m. It then flew off on the port side.

8.—At a time not ascertained, a shell of a 6 "kin" quick firing gun (?) perforated the netting, beneath the after davit of the starboard 1st cutter on the stern, from above downwards and inwards, making a hole of 80 m.m. in the inner plate of the netting, and cutting off a haul of the 1st cutter. It then exploded towards the opposite side, but without casualty.

Besides the above mentioned, the knee below the electric light of the fore mast, the upper deck, the funnel, the ship's sides, boats, and the rigging of the main mast, showed marks of small shell pieces and small shots, but what directions they came from was uncertain. The injuries caused by them were very slight, so that these are not worth mentioning.

The Chiyoda. 1.—At 3.23 p.m., a 21 c.m. shell penetrated the port midship, at a point 1.95 metres above the sea level, making a hole of 0.27 m. in diameter and passing through the paymaster's store and a portion of the lower deck. It then entered the engine room above the armour door and flew out through the starboard side near the water line, destroying in its course a portion of the starboard side of the lower deck and the starboard coal bunker. No casualty.

2.—At a time not ascertained, a shell from a Nordenfelt machine gun penetrated the starboard bow at a point 3.5 m. above the sea level, and fell upon the upper deck. There it stopped without inflicting any injury.

3.—At a time not ascertained, a shell from a Nordenfelt machine gun passed through the starboard torpedo-director on the upper deck of the stern, and did a little damage.

In addition to the above, there were two marks left by Nordenfelt machine gun shells. One of them was on the port midship at a point 3.35 metres above the sea level. The other was a little nearer to the bow at a point about 2.35 metres above the sea level. Both of them failed to perforate the iron plating.

The Hiyei. 1.—At about 1.15 p.m. a 21 c.m. shell came flying over the netting of the starboard waist, and, piercing the pinnace, and the keel of the steam launch above the booms, about 5 meters above the sea-level, exploded against the stanchion of the port booms, tearing one third of its upper part. The fragments of shell flying in all directions caused heavy damage to the port waist deck and several places on the side; and at the same time produced an explosion of gun powder in the bags belonging to No. 4 gun. At this time, three men belonging to No. 4 port battery on the waist deck, were killed by the fragments, and one man by the explosion of the powder; Lieutenant M. Takashima, commanding the port battery, and two men ,were also injured by the fragments or wooden splinters.

2.—About 1.17 p.m., a 12 c.m. shell dashed into the upper deck, (about 2.9 meters above the sea-level) through an open port at the lower end of the starboard cutter davit at the stern, damaging the planks around the sea port. It then left the ship by a stern port hole without exploding; but during its passage it knocked off the head of a man of No. 9 gun.

3.—At about 1.18 p.m., a 15 c.m. shell smashed the aft and upper part of the stern starboard port, then turned obliquely astern and left the ship, making a hole through the port side of the stern where the life buoys were. At the time, four men in the battery of No. 9 gun (stern gun) were wounded by broken wooden splinters.

4.—About 1.20 p.m. a 12 c.m. shell pierced through the ship's side behind No. 7 gun port in the middle of the starboard, crushing the wooden and iron planks as well as the iron-ring of the elevator of No. 7 gun ; and the shell, not bursting, glanced off over the port netting, wounding three men with the wooden splinters and, one with a broken piece of iron.

5.—About 1.25 p.m., a 17 c.m. shell exploding on the sea near the starboard, some of its fragments rebounded cutting off the mast-head-line and striking against the main mast-head, some fragments of the shell and the iron wall of the mast fell through the hollow of the mast into the engine room. No one was injured.

6.—About 1.25 p.m., a 47 m.m. shell entered the lower deck by making an aperture through the starboard side in front of the bridge, at a point 0.7 meter above the sea-level, and shattered the shelves in the captain's scullery; the shell bursting, the fragments and wooden splinters were scattered in all directions, greatly damaging the utensils and the walls of the room. One of the fragments flew out of the room and entered a clothes-box, where it lodged. No one was killed or injured.

7.—About 1.27 p.m., a 15 c.m. shell passed through the netting above No. 5 gun port behind the starboard gangway, and flew off over the port netting without doing any one an injury.

8.—At a time not ascertained, a 37 m.m. shell came from the starboard side and passed into an oil-tank (about 5.3 meters above the sea-level) on the upper deck of the stern behind the bridge, and lodged there without causing injury.

9.—About 1.30 p.m., a 30.5 c.m. shell passed through the ship's side, striking the lower-deck below the cutter davit at the starboard stern (about 1 meter above the sea-level). It came through the captain's bed-room and broke into the wardroom, where it struck the iron mizzen-mast, and, exploding, smashed it, at 900 m.m. above the lower deck. The fragments flew in every direction completely destroying the wardroom, the captain's cabin, his bed-room and water closet, the chronometer room, and the rooms of the 1st and 2nd lieutenants, also the rooms of the chief surgeon, the chief paymaster, the gunnery lieutenant, the torpedo lieutenant and the chief engineer. Besides this the account room, gun-room, and gun-room scullery, and the desks, chairs, and various other furniture in all those apartments were destroyed. The lower deck had a hole of 3 square meters and the upper one of 2.5 square meters; the 3rd and 4th water tight doors, No. 5 pump in the 4th section of the lower deck, the iron beams, 11 scuttles, the provision store, the magazine beneath the ward-room and the port ladder of the bridge, the ventilator, and the ship's side were all destroyed or injured. The shock of the explosion produced cracks in the commander's cabin, the chart room, the chief navigator's room and on the bridge; and the gas of the exploded powder and the wooden splinters passing through the two sky-lights on the top of the wardroom caused injuries to those who were on the quarter-deck. By this accident 14 were killed on the spot and 26 were wounded either by the fragments of the shell or the splinters of the timber and furniture. They are as follows: (Refer to the diagram of the destroyed lower deck of the ship in the fourth chapter.)

In the wardroom (the surgery) of the 5th section of the lower deck;

Killed:—

Chief Surgeon, T. Miyake.

Chief Paymaster C. Ishizuka.

Assistant Surgeon, C. Murakoshi.

One medical attendant, three bearers, and two wounded men.

Wounded:—

Two medical attendants, one bearer, and one wounded man.

Near the entrance to the machine gun magazine (beneath the wardroom) below the lower-deck;

Killed:—Two men.

Wounded:—Four men.

In the stern cabin;

Wounded:—Four men in charge of the relieving tackle.

In front of the accountant's office, on the port side in the 4th section of lower deck;

Killed:—Three men of the fire-brigade,

In the 4th section of the lower deck ;

Wounded :—

Sub-Lieutenant M. Ogawa, lower deck mate and four men.

In the 3rd section of the lower deck ;

Wounded :—Three men.

On the quarter deck ;

Wounded :—Five men.

On the bridge ;

Wounded :—One signal man.

10.—About 1.30 p.m., a 47 m.m. shell struck the 2nd cutter on the port side near the stern from the left side to the right (6.5 meters above the sea-level), and then passed off, destroying both sides of the 1st cutter on the starboard side. No injury to officers or men.

11.—About 1.30 p.m., a 12 c.m. shell pierced the lower part of the netting in front of the port gangway, and then, passing just below the booms, damaged the ship's side behind No. 3 gun port on the starboard side, and proceeded on its way. No injuries.

12.—About 1.30 p.m., a shell exploded on the water near the port side. The rebounding fragments struck the ship's side, where the port sheet anchor lay, and lodged there (4.2 meters above the sea level).

13.—About 1.30 p.m., fragments of a shell exploding on the surface of the sea rebounded, and slightly damaged the outer plating of the ship's side just below the lower part of the starboard cutter at the stern (1 meter above the sea-level).

14.—About 1.50 p.m., a 47 m.m. shell struck the ship's stern (4 m. above the sea-level) where the starboard life buoy lay, and then passing over the upper deck to the left, destroyed the wooden planks in front of the upper part of the chief navigator's room, and left the ship passing obliquely toward the left. The junior navigating officer

Sub-Lieutenant Y. Tanaka who was at the port side of the chart-room on the upper deck, was wounded by the flying wooden splinters.

15.—At some time not ascertained; fragments of a shell exploded on the sea near the port side, rebounded, and slightly damaged the outer plating (3.3 meters above the sea-level) at the port side of the stern.

16.—At an uncertain time; fragments from a shell that had exploded on the water, shattered the outer plating at the lower part of the starboard cutter. (1.2 meters above the sea-level).

17.—At an uncertain time; fragments of a shell that burst on the sea near the port side damaged the outer plating of the side (2.4 meters above the sea-level) behind the place where the port stream-anchor was lying.

18.—At an uncertain time; a 12 c.m. shell pierced from right to left through both sides of the stern of a steam cutter placed above the middle booms (5.9 meters above the sea-level).

19.—At an uncertain time; a 47 m.m. shell came sweeping over the midship starboard netting and broke through the gunwale of the port gig (5.5 meters above the sea-level).

20.—At an uncertain time; a shell destroyed the main top-mast cap, and damaged the starboard main royal lift and shot through the ship's flag on the main mast.

21.—At an uncertain time; fragments of a shell that exploded on the sea near the port side lodged in the heel of the mizzen-mast.

22.—At an uncertain time; a shell grated the machine gun battery (5.2 meters above the sea-level) on the poop deck, without injuring any one.

23.—At an uncertain time; fragments of a shell that exploded on the sea near the port side damaged outer plating of the side (4.5 meters above the sea-level) below the fish-davit of the forecastle.

Further, during the preparation for action previous to the engagement, a man in charge of a torpedo-tube was injured while conveying a torpedo; also, several ropes were cut either by shells or splinters; but no record is made of these cases, as they were not accompanied by any personal injuries.

At the battle of the Yellow sea, it was the Hiyei that bore the brunt of the fight. On one occasion, she was wholly surrounded by the enemy's ships and her fate seemed almost sealed; consequently the damages and losses she sustained were exceedingly great. For the numbers of killed and wounded, she stands next to the Matsushima. To complete the tale of her disasters, the surgery was utterly destroyed by a shot and the whole of her medical staff either killed or severely wounded. The wounded were thus compelled to rely upon non-medical men for temporary relief; and it was not until the ship returned to the fleet station, near the Choppeki Cape, that she was at last able to have the sufferers treated by the surgeons from other ships. The report below, furnished by Chief Surgeon B. Tomatsuri, who was principally engaged in the management of the wounded, and other medical affairs after the disabling of the Hiyei's medical staff, will throw some light on the details of the hard fight and the behaviour of the medical men during that time.

Report from personal observations on the management of the killed and wounded in the battle of the Yellow sea, by B. Tomatsuri, Chief Surgeon of the Hiyei, succeeding the late Surgeon T. Miyake.

The naval fight between the Japanese and Chinese fleets at the Yellow sea on the 17th September, 1894, lasted as long as five hours, the fight being carried on with the utmost energy and courage on both sides, and with ships and machinery of the latest style. Our fleets therefore could not escape a large loss in killed and wounded. Personal observations of the management of the sufferers on each vessel engaged, can not I believe, but be of great benefit to those who serve in the medical and sanitary departments of the navy. The Hiyei was in the thickest of the fight, but unfortunately her two surgeons were killed during the battle and the circumstances of the time can not therefore be obtained from any surgeon actually engaged during the battle. At the time of the engagement, I was at the fleet *rendezvous* on board the transport Doyo-maru. The following morning, I came on board the Hiyei when

I had the sad duty of inspecting the corpses of those who had honorably died, and of treating the wounded. Then, being appointed chief surgeon of the ship in succession to the late Chief Surgeon Miyake, I had the honour of re-arranging her medical affairs. Here I humbly report on the circumstances of the battle as far as I was told them by actual witnesses on board the ship and on what I observed there myself afterwards.

At 5.11 p.m., on the 16th September, the Matsushima, Chiyoda, Itsukushima, Hashidate, Hiyei, Fusō (the Main Squadron), the Yoshino, Naniwa, Akitsushima, Takachiho (the First Flying Squadron), with the Akagi and Saikyo-maru, numbering 12 warships in all, departed from the temporary anchorage near Cape Choppeki in Korea, and during the following morning, (the 17th) cruised about the vicinity of Haiyang island off the Shing-king district of China, in search of the hostile fleets but in vain. We now changed our course to the north-east, and approached the mouth of the river Taiyang when, at about 11.30 a.m., we descried a few steam-ships at a distance. Coming near them, we recognized them as a Chinese fleet consisting of over ten ships. At 0.8 p.m., a big flag was hoisted on the main mast of the flagship Matsushima; following her example, our ship hoisted a flag on the main mast and blew to quarters. At the signal, Chief Surgeon, T. Miyake, Chief Paymaster C. Ishizuka, Assistant Surgeon C. Murakoshi, and three medical attendants, numbering 6 in all, assembled in the wardroom in the 5th section of the lower deck assigned as the surgery, taking with them every article necessary for treatment, and covering the table with a rubber sheet, so that all preparations were made for receiving the wounded. At 0.50 p.m., firing was opened by the enemy's fleets to which ours did not reply until we got at a distance of 4,000 meters from the enemy; at 1.08 p.m., both fleets approached by degrees, the Chinese fleet changing their position gradually, the angle of the enemy's double quarter lines seemingly intending to intersect our line ahead. At about 1.14, our ship being unable to follow the Hashidate, which advanced just ahead at a suitable distance, we fell behind to a distance of 1,300 meters, when two hostile vessels at the angle of the lines, deeming it the sole opportunity for attack, turned their helms, and bearing down upon us were about to ram us. The peril was imminent, but, with desperate resolution, we determined to thrust ourselves through the enemy's line, by making free use of the helm, so as to throw the enemy's lines into confusion. Showers of shots and shells were poured upon us from the foe on both sides. The gunners on either side of our ship worked desperately at their guns; four men at No. 4. gun, and one at No. 9

gun being killed outright, and Lieutenant Takashima, who was directing the battery, with ten men and one stretcher-bearer, being wounded. This manœuvre was quite successful ; our ship passed through the enemy's line and was about to effect her escape, when she was pursued by the hostile ships, Ting Yuen, Chen Yuen, and Sai Yuen (?). A 30.5 c.m. shell fell into the wardroom (the surgery) through the captain's bed room on the starboard, where it hit the mizzen-mast and exploded, causing terrible damage in the ship, so that forty officers and men were killed or injured at one time (the places damaged and the names of those killed or wounded will not be stated here to avoid repetition as they are detailed in the text).

The articles in charge of the chief surgeon, destroyed by the explosion of the 30.5 c.m. shell in the surgery, are as follows :—

DRUGS.

Carbolic acid	9,000 gm.	Hydrochlorate of morphine	4 gm.
Dilute hydrochloric acid	1,500 ,,	Salicylate of sodium	227 ,,
Plaster of Paris	4,000 ,,	Sulphate of magnesium	1,000 ,,
Sulphate of quinine	196 ,,	Castor oil	550 ,,
Muriate of cocaine	1 ,,	Dover's powder	60 ,,
Corrosive sublimate	60 ,,	Brandy	650 ,,
Chloroform	250 ,,	Vaseline	500 ,,
Iodoform	550 ,,	Refined camphor	6 ,,
Strong solution of per-chloride of iron	225 ,,	Ether	54 ..
		Tartaric acid	708 ,,

CONSUMABLE MATERIALS.

Sponge	4	Pins	182 pieces.
Paddings for wooden splints	4 sheets.	Leathers	3
Cotton cloth	60 "*tan.*"	Oiled paper	26 sheets.
Lint	2 "*tan.*"	Bladders	9 pieces.
Cotton wool	450 "*momme.*"	Earthern cups	3
Linseed oil paper	25 sheets.	Earthern bed pan	1
Triangular bandages	100	Test tubes	11
Silk threads	5 "*momme*" 7 "*fun.*"	Soap	6 pieces.

Nail brushes	2
Wax matches	1 box.
Corrosive sublimate gauze	25 "'*tan*."
Corrosive sublimate cotton-wool	800 "*momme*."

Rubber tubes	5 "*shakû*."
Splints (large)	30 pieces.
Splints (small)	50 pieces.

PERMANENT INSTRUMENTS.

Third class surgical instrument case	1 set.
Razor	1
Brass irrigator	1
Dressing trays	3
Brass basins	3
Brass spitoons	3

Stretchers	2 sets.
Medical sack	1 set.
Portable surgical bag	1 set.
Dressing instruments	1 set.
Iron spatula	1
Brass pitcher	1
Copper pan	1

NON-PERMANENT INSTRUMENTS.

Hypodermic syringe	1
Clinical thermometer	1
Rubber syringe	1
Truss	1
Cups for draught	3
Liston's long outside splint	1
Wooden splints for lower limb	2
Sheet for operating table	1

Tin funnel	1
Cork screws	2
10 gm. glass measures	2
200 gm. glass measure	1
Bottles for medicine shelves	5
Dispensing bottles	6
Ointment pots	3
Towels	3

A portable surgical bag and a set of dressing instruments besides the articles mentioned above were irretrievably damaged.

As the cabin, wardroom, and the neighbourhood of the magazine for machine guns caught fire from the explosion of the shell, one half of the ship's crew were stationed at their assigned posts to extinguish the fire. One half of the ship's inmates being thus employed in putting out the fire, the supply of ammunition was interrupted, so that the ship almost lost her fighting power. It was therefore deemed expedient to retire beyond the range of the guns, so as to get time to make necessary changes in the disposition of the crew, and consequently at 2 p.m., we made the following signal thus:—"Our ship is on fire; leave her out of the line," and getting out of the line we steered to the south-west, where by concentrated effort, we succeeded in putting out the fire at about 3.30 p.m., and now recovering our fighting power, proceeded again to join our squadron and resume action. We therefore steered towards where our fleets had been, but it was now growing dark, and not only was it difficult to distinguish our vessels from the enemy's, but as we had sustained the heavy loss of 19 killed and 37 wounded, and, to make the matter worse, all the surgeons and nurses being either killed or severely wounded, we had no alternative but to steer for the temporary anchorage near Cape Choppeki. At the time when the fire was being put out, three able seamen were appointed as a temporary nursing staff, and by these men the wounded were cared for as far as possible. Over twenty shells in all struck our ship, but of those not more than four caused fatal or other injuries. So far I have related what was told me by eye-witnesses. As soon as the ship cast anchor at the *rendezvous* near Cape Choppeki, she made a signal for surgeons to the Kaimon and the transport Doyo-maru, etc., which were stationed in the vicinity. In compliance with this demand, Staff Surgeon Ishio, Assistant Surgeon Yoshimura and a nurse from the Kaimon, with myself and a nurse from the Doyo-maru soon went on board the Hiyei. On inquiring why surgeons were demanded, we were told that on the afternoon of the previous day the 17th, a severe fight had taken place between the Japanese and Chinese fleets off Haiyang island, and the Hiyei, having been in the thickest of the fight, had very many on board killed or wounded. As moreover the surgeons and nurses had been killed or severely injured, the wounded had been left to themselves, and we were therefore asked to attend them at once. Consultation was held with the surgeons from the Kaimon. We wished to start the indispensable treatments of the sufferers without delay but all the medical materials had been destroyed by the explosion of the enormous shell and the consequent fire, and we were compelled to send for necessary materials from the Kaimon. A temporary surgery was established at the battery under the poop deck; the sufferers were removed there one by one, and their wounds temporarily dressed; for the ship being in a greatly confused conditions, we could not give satisfactory treatment. So the wounds were first cleansed by washing, and fragments of shell or wood removed; splints were applied to fractures and the wounds dressed with antiseptic bandages. This was all we could do at the time. Soon afterwards Surgeon Hinata from the Chiyo-maru, and Surgeon Asai from the Genkai-maru came on board and gave willing assistance in treating the wounded. By some time after one in the afternoon all the sufferers had been more or less attended to, but there were still twenty corpses piled on the poop deck awaiting examination. As it is of course the duty of naval surgeons to ascertain the causes of death by inspecting the corpses, so by permission of the Captain, we commenced about 1.30 p.m. to examine each of the killed on the poop deck. Their ranks and names, with the characters of the wounds that we perceived to have proved fatal were recorded, and locks of their hair cut off as mementos for their respective families.

The official ranks, names, and wounds of killed are as follows :—

NAMES OF WOUNDS.	RANK.	NAMES.
Mutilation of the lumbar region	Chief Surgeon	T. Miyake.
Mutilation of the abdominal region	Chief Paymaster	C. Ishizuka.
Ditto	Assistant Surgeon	C. Murakoshi.
Mutilation of the whole body	1st class petty officer	K. Danno.
Mutilation of both thighs	1st class steward	T. Fujita.
Mutilation of the left thigh and right leg	2nd class petty officer	G. Nishiya.
Perforated gun shot wound of chest and abdomen	3rd class petty officer	S. Suyehiro.
Lacerated wound of chest and abdomen with mutilation of thigh	1st class seaman	S. Sunagawa.
Compound fracture of the face and the base of the skull	1st class seaman	K. Kanai.
Mutilation of the whole body	1st class seaman	H. Shimasaki.
Compound fracture of the forehead	1st class steward	K. Nakagawa.
Compound fracture of the lower and upper extremities	2nd class seaman	M. Furuya.
Crushed wound of the cranium	2nd class seaman	S. Arimatsu.
Compound fracture of the face, base of skull, and the upper and lower extremities	2nd class carpenter	T. Ōya.
Perforated gun shot wound of the lumbar region and the compound fracture of the upper and lower extremities	2nd class nurse	T. Ishikawa.

Contusion of right side of chest and right arm and compound fracture of the right lower extremity	3rd class stoker	Y. Nihongi.
Mutilation of the thoracic, and dorsal regions, and of the lower limb. ...	4th class seaman	A. Takenaka.
Crushed wound of the cranium	4th class seaman	M. Chikamatsu.
Lacerated wounds of the lower jaw, and neck, and contused wounds of the abdominal region and the lower limb	4th class seaman	S. Moroyu.
Crushed cranium	4th class seaman	H. Nishihara.

After the examination, the corpses were in succession carefully wrapped in blankets and canvas. This inspection ended at three o'clock in the afternoon. The wounded who were alive numbered 35 ; of whom 19, being considered to need treatment in the hospital, on consultation with other surgeons, were removed to the transports, 10 to the Genkai-maru, 5 to the Doyo-maru, and 4 to the Chiyo-maru. On that day the sea was running very high, and we experienced great difficulty in taking them on board the transports. The remaining 17, being rather slightly wounded, were left to undergo treatment in the ship, which, having effected a few absolutely necessary repairs, left the *rendezvous* again for Haiyang island. At 10.20 p.m., the burial services of the late Chief Surgeon Miyake and nineteen others were commenced, and at 10.40, the ship being brought to halt, their honorable remains were committed to the deep, at 38° 21′ north latitude and 124° 23′ east longitude. At eleven, we steamed on again, and arrived, at noon of the 19th, in the vicinity of Haiyang island, where we sought for our squadron in vain ; advancing further, we came to the mouth of the Taiyang river and cruised about with no better success ; so we veered towards the Yalú, but as night had set in, again changing our course, we returned to the anchorage at half past six on the morning of the 20th, where we found ourselves again with the Principal Squadron. When anchored in the station, we were visited by surgeons from the Hashidate, by whom the wounded were for a time attended and treated. However, on the 22nd I was transferred to the chief surgeoncy of the ship by order of the Chief Commander of the Combined Squadron ; I removed aboard her directly and made arrangements for replacing the medical materials lost at the fight on the Yellow sea as well as about the killed and wounded. Unfortunately the ship's medical papers were almost all lost in the battle. The nine injured men from our ship that had been sent to the Doyo-maru and Chiyo-maru on the 18th, were again transferred by order of the flagship to the transport Genkai-maru on the 19th next, to be sent back to the Sasebo naval hospital. Of the sufferers thus conveyed back, 1st class nurse S. Kato died on the Genkai-maru on her way home to the hospital, 3rd class steward T. Yoshihayashi and 4th class seaman J. Umimichi succumbed to their wounds in the Sasebo naval hospital, and the other two, 3rd class petty officer S. Suge and K. Takenishi, afterwards returned to the ship, having recovered at the Kure naval hospital to which they had been removed. The rest being transferred to the charge of the naval barracks, we did not hear any more reports about the progress of their wounds, but I believe they all quite recovered. The seventeen wounded that were treated in the ship all got well so that they could resume their duties aboard.

The Yoshino. 1.—At about 1.08 p.m., a 15 c.m. shell pierced the starboard netting (about 3.6 meters above the sea level) on the stern, and striking two of the shells for 12 c.m. quick-firing gun, that were placed in a row inside the netting, exploded together with the two shells and tore the starboard side of the quarter deck,—that is, the ceiling of the wardroom. A portion of the fragments of shell dashed into the wardroom, another hit through one side of the wall of a ventilator on the same deck and struck through the port netting, then striking a 12 c.m. shell lying inside, exploded it and at the same time set the netting on fire. By these shell fragments a man was killed out right, and Sub-Lieutenant S. Asao with 7 men on the quarter deck and a nurse in the wardroom (surgery) were wounded.

About one in the afternoon, Midshipman T. Hirai (engaged as assistant to the Chief Navigating officer), in the conning tower at the bow, got his tympanic membrane rent by the shock accompanying the discharge of the forecastle gun.

2.—About 2.30 p.m., a 21 c.m. Krupp gun (?) shell exploded against the starboard bow, e.g. the outer wall of the coal bunker (about 300 m.m. above the sea level), the fragments penetrating into the bunker. Soon after the damage, a carpenter who was sent outside to repair the hole, received an injury on his fingers.

3.—About 3 p.m., a fragment of a 15 c.m. Krupp gun shell penetrated into the wardroom (about 760 m.m. above the sea level),—that is, on the starboard side of the lower deck at the stern, and lodged in the mattress of the sofa on the starboard side of the room. It caused no injury to life.

4.—A shot of a small-calibre gun perforated a hole near the keel in the fore part of the gig.

5.—A fragment of a 12 c.m. shell made a hole 20 c.m. wide in the upper part of the funnel.

6.—A piece of a 12 c.m. shell perforated the middle portion of the funnel making a hole of 76 m.m. width.

7.—Three shell marks were left in the starboard waist (1.2 meters above the sea level).

8.—A fragment of a 12 c.m. shell made a hole in the exhaust-steam-pipe at the rear of the safety valve.

The Naniwa. 1.—At an uncertain time, a shot from a Hotchkiss' gun reached the starboard bow (1.7 m. above the water) and left a conical depression on the outer plating but without penetrating.

2.—At 1.08 p.m., a 21 c.m. shell struck No. 3 starboard coal bunker of the fore part at a point about 30 c.m. below the water-line and made an oval hole 1.1 m. by 0.5 m. width, at the same time breaking a rib at the spot and bending the ribs and strongers in the neighbourhood.

3.—Time uncertain : a shell from a 21 c.m. gun fell on the sea near the starboard stern, and, rebounding, struck the starboard side of the stern (2.4 m. above the water), leaving a distinct mark on the outer plating, and broke one of the beams at that part. It also completely destroyed the wash-stand furnished for the use of the gun room officers.

Shell fragments struck six other places : (a) one perforated a hole 120 m.m. in diameter in the upper part of the hammock netting at the rear of No. 1 side-gun on the fore part of the starboard side ; (b) one made a hole 60 m.m. in diameter in the funnel, by going through from right to left at 6.55 m. above the upper deck ; (c) one pierced through the starboard waist (2.8 m. above sea level) and entered the warrant room on the lower deck where it lodged on the clothes shelf passing through the inner wall ; (d) one made a hole 120 m.m. by 30 m.m. in width on the starboard side of the torpedo-room at the stern (460 m.m. above the sea) ; (e) one made a hole 100 m.m. in diameter on the right and back part of the wall of the barbette, and lodged in the gun support ; (f) another hit the starboard side of the stern, breaking a rivet and leaving a fissure over 50 m.m. in width.

During the fight, T. Kubota, Assistant Engineer in the engine room, slipped while at work, in consequence of a shock from the firing of the stern gun, and got his fingers jammed in the engine, and Lieutenant S. Nakamura, who was commanding the starboard battery had his tympanic membrane ruptured by the shock of a gun discharge.

The Takachiho. 1.—At about 1.09 p.m., an ordinary 15 c.m. shell hit the starboard quarter (900 m.m. above the sea-level) and exploded. Several marks were left on the side, and three fragments made holes in the side 220 or 230 m.m. in diameter, and, entering the room of an officer, broke all the furniture, and eventually lodged in the gunsupport of the stern gun. The fire thus caused among the clothing and wooden splinters was soon put out, a carpenter, who was in the gun support turning the fan for the magazine, was killed by the fragments, and a cook was injured by a wooden splinter. Another fragment of the shell destroyed the ladder fixed to the search-light on the starboard quarter, and glanced off obliquely over the port side, and one more piece shattered the wheels of a field gun placed on the starboard just outside the wall of the barbette of the stern gun.

2.—Time uncertain; a shell rebounding from the water on the starboard side hit the starboard quarter below the hawse-hole (1.5 meters above the sea-level); owing however to its impaired force, nothing more than a depression was left on the outer plating.

3.—Time uncertain; a shell from a Nordenfelt machine gun perforated a scuttle of the cabin on the starboard side.

4.—Time uncertain; a spent shell rebounding from the water caused a depression above the torpedo-tube hole in the fore part of the starboard (1.35 meters above the sea level).

5.—Time uncertain; a shell from the starboard side destroyed the bottom of No. 1 cutter on the starboard booms of the after part on the upper deck (4.5 meters above the sea-level), and then shattered No. 2 cutter on the port side. No person was injured.

A fragment of a shell cut asunder one of the whips for the use of the main-top; and at 3 p.m., a gunner of No. 4, 15 c.m. side gun on the port side of the waist deck had his fingers injured, while firing, by the gun gears.

The Akitsushima. 1.—At 1.09 p.m., a 21 c.m. common shell struck the upper part of the shield of No. 5, 12 c.m. gun on the starboard waist of the upper deck (4.2 meters above the sea-level), and exploded. The flying fragments killed or injured as follows:—

A gunner and three of the crew of the above gun, and Lieutenant R. Nagata commanding officer of the port battery, then standing by No. 6, 12 c.m. side gun were killed outright; and one of the crew of No. 5, 12 c.m. port gun, a gunner and two of the crew to No. 6, 47 m.m.

port gun; three ammunition men near No. 5, 12 c.m. starboard gun and a stoker near the hatch of the fore engine room were wounded.

2.—At about 1.50 p.m., the fragments of 21 c.m. shell damaged the starboard cutter, the hammock netting of the haul davit belonging to the cutter, the wall plates of the gun gear store below the conning tower, the glass window of the chief navigating officer, the rails of the ladder to the bridge and the hammock netting of the haul davit of No. 2 cutter, but did no injury to men or officers.

3.—About 2.10 p.m., a broken piece of a 15 c.m. shell (20 c.m. long 8 c.m. thick) penetrated the outside plating of the hammock netting of the starboard waist (4.2 meters above the sea level) where it was stopped owing to the presence of coiled ropes within.

4.—At 2.45 p.m., a 15 c.m. shell penetrated, on the port side of the lower part of the shield of the stern gun on the poop deck (5.76 meters above the sea level), and broke a part of the deck and the starboard shell stand. At the time, a gunner of the battery was wounded by a wooden splinter of the deck. Later in the action, at 1.30 p.m., a stoker was thrown off the steps of the engine room by the shock of a firing gun and received injuries on his chest.

The Akagi. 1.—At about 1.15 p.m., a 57 m.m. shell crushed the outside plating and cleat behind No. 5 q.f.-gun on the starboard side of after part (1.95 meters above the sea level) and passed off toward the port side. At the time, one of the crew of No. 6 q.f.–gun on the port side of the after part of the upper deck was injured by a broken piece of iron.

2.—About 1.20 p.m., broken pieces of an ordinary shell from the starboard beam struck the bridge and wounded Lieutenant H. Sasaki, a signal man, and a blue-jacket belonging to No. 2 q.f.–gun, who were then on the bridge.

3.—About 1.20 p.m., fragments of an ordinary shell came from the starboard side and passed away to the port side through a hole in the shield of No. 3, 12 c.m. gun on the waist deck. At the time, one of the crew of the above gun was injured by a piece of the shell.

4.—About 1.20 p.m., a 57 m.m. Hotchkiss shell came from the starboard beam and struck the inclined part of the shield of No. 3, 12 c.m. gun, without piercing through it; but it only left a depression where it struck and bent the square irons attached thereto.

5.—At 1.22 p.m., a 47 m.m. Hotchkiss shell passed over the foretop, where it killed Midshipman T. Hashiguchi and wounded a top musketeer.

6.—About 1.25 p.m., a 15 c.m. shell that came from the stern, struck the inner part of the starboard side below the bridge, and burst (not exploded) against No. 1 q.f.–gun support, and broke it. The fragments of the shell killed Captain H. Sakamoto and two of the crew of No. 1 q.f.–gun, all of whom were then on the bridge, and injured two others of the crew of the same gun. Almost at the same moment, a signal man who was also on the bridge was wounded by a Gatling shot.

7.—About 1.25 p.m., a 12 c.m. shell exploded and knocked through the side below the water-closet on the starboard bow (300 m.m. above the sea-level). The fragments flying about the fore part of the lower deck, killed four fire-brigade men and injured one. Further the steam pipe opening to the ventilating fan was honeycombed by the fragments.

8.—Between 1.25 and 1.30 p.m., shell fragments came flying from the starboard beam and glanced away to the port side, grating off in its course the back wall of the water-closet in the fore part of the upper deck. Three men who were then working at the Downton pump in the fore part of the upper deck were instantaneously killed.

9.—At 1.30 p.m., a 15 c.m. shell knocked through the outside plating below the captain's water-closet on the starboard after quarter of the upper deck, and breaking a part of the closet passed off to the port side tearing three plates of the upper deck and stripping off the sky-light in its course. No harm to any person.

10.—At 1.30 p.m., a shell fragment came sweeping from the starboard side of the after part, and passing by the lower part of the shield of No. 3 q.f.-gun on the starboard side of waist deck, wounded three of the crew of that gun. It then glanced to the port bow of the upper deck where it wounded a petty officer.

11.—About 1.35 p.m., a 12 c.m. shell grated off the vicinity of the hinge of the door of the port-hole of the stern gun (No. 4, 12 c.m. gun), 1.5 meters above the sea-level, and went off to the port side, breaking the ventilator in the after part of the sky-light. No damage to any person.

12.—About 1.40 p.m., a 57 m.m. shell made an oval hole in the outside plating at some 450 m.m. above the spot on the starboard side of the after part which had been struck by the ninth shell and broke another part of captain's water-closet and then tore three hammocks provided for the protection of the sky-light of the cabin, before dashing off to the port side.

13.—At 1.40 p.m., five or six shell fragments came from the stern and passing by the left side of the shield of the stern 12 c.m. gun, went away to the port-side. At this time, two of the crew of No. 5 q.f.-gun, who were then on the starboard after quarter of the upper deck were wounded by small pieces.

14.—Between 1–2 p.m., a fragment of a shell pierced through the door of the port-hole of No. 2, 12 c.m. gun in the fore part of the upper deck (about 1.2 m. above sea). No injury to persons.

15.—About the same time as above a fragment of shell struck the starboard ash shoot (1.2 meters above the sea-level) without causing any apparent damage.

16.—Time same as above, a shell of small calibre struck the first cutter suspended to the davit, on the starboard side of the after quarter, and exploded without any injury to life.

17.—Between 1.30–2 p.m., four or five shells above 12 c.m. in size, came dashing from the starboard beam at one time, and striking the main-mast cut it into three. They also split the spankergaff and tore the starboard rigging to pieces, without causing death or injury to persons.

18.—Time same as above, a shell struck the second cutter, suspended from the davit on the port side of the after quarter, and damaged its gear and outside plating. No death or injury.

19.—About 1.40 or 1.50 p.m., a 57 m.m. Hotchkiss shell pierced the upper part of the funnel, from starboard to port (7.5 meters above the sea-level) and passed away.

20.—About 2 p.m., a 57 m.m. Hotchkiss shell came from the stern, and striking through the left side of the shield of the stern 12 c.m. gun, exploded there, damaging the regulator of the gun, and wounding a gunner of the same gun.

21.—At 2.15 p.m., a 15 c.m. shell coming from the stern, struck the starboard nettings near the bridge and glanced off toward the bow. At the moment, Chief Navigating officer T. Sato was wounded by a broken piece of metal and a wooden splinter.

22.—Between 2–2.30 p.m., several pieces of an exploded shell impressed 8 marks on the port door of the stern 12 c.m. gun.

23.—Time as above. A fragment of 17 c.m. shell broke the starboard side of the gallant forecastle and lodged in the bollard heads.

24.—Time as above, a 37 m.m. Hotchkiss shell pierced through the foremast, at point of 600 m.m. below the top and flew off forward.

25.—Time as above, a Gatling shell (?) damaged the nettings on the bridge, impressed several marks on the search light, and smashed the lens.

26.—About 2.30 p.m., a 57 m.m. Hotchkiss shell hit through the outside plating, and the port door at the left side of No. 5 q.f.-gun on the starboard side of the after quarter, (about 1.2 meters above the sea level), and broke three plates of the upper deck, causing it to leak. It then glanced off to the port side, causing no injury to persons.

27.—Time uncertain ; a 37 m.m. Hotchkiss shell pierced through the swinging boom placed against the starboard rigging, and tore the latter asunder.

28.—Time uncertain ; a 57 m.m. Hotchkiss shell knocked a hole through the lower part of the funnel (4.5 meters above the sea level), that is, about 1.5 meters above the casing and passed away.

29.—Time uncertain ; a 37 m.m. Hotchkiss shell struck into the shield of the stern 12 c.m. gun, without piercing it.

30.—Time uncertain ; a 47 m.m. Hotchkiss shell(?) came flying from starboard beam, and striking the barrel of No. 1 quick-firing gun on the starboard of the bridge, only left a depression.

In addition to those above mentioned, Nordenfelt or Gatling shells left numerous marks on the nettings of the bridge; and several perforations were made by the fragments of a shell at the top of a ventilator, opening to the engine room on the starboard side of the waist, and other small fragments left their marks on the back of the foremast.

At the battle of the Yellow sea this warship was one which was reduced almost to the last extremity, one-third of her complement being killed or wounded including Captain Sakamoto who fell a victim to a hostile shell. She was no more than a gun-boat, her medical staff consisting of only a chief surgeon and a nurse. The difficulties experienced by them in executing their duties can hardly be imagined. From the following report on medical work during the engagement furnished by K. Usui, Chief Surgeon of the ship, we shall be able to see how the medical department of the ship was managed.

On September 16th 1894, our ship set out from the temporary anchorage at Cape Choppeki, together with the Main and First Flying Sguadrons, and arriving at Hai-yang island on the forenoon of the 17th, reconnoitred the interior of the bay of that island ; and at Tai-ku-shan, she descried the enemy's fleet in the distance. At 0.20 p.m. she took her position for action, and opened firing at 1.09. Owing to the low rate of her speed, we fell behind the main body during the battle, and being thus separated, naturally became the object of the enemy's concentrated attack. We were indeed once, in a very precarious condition from which it took a great deal of hard fighting to extricate ourselves, and rejoin the main squadron. Herewith I have the honour of reporting my personal experiences of medical work during the combat.

The surgery of the vessel during the time of action had been prepared in the fore part of the lower deck, but owing to its nearness to the magazine, and to the fact, that there was no partitioned place to admit the passage for ammunition suppliers, it was necessary to get a safe place below the water line e.g. cock-pit ; but this being too narrow, and inadequate for the surgery, the Captain gave us permission to use his cabin as a surgery during the battle. The table in the middle of the cabin was made into an operating table ; the benches on both sides of the ship and the stairs above them serving as bed-steads. The skylight was closed and protected with hammocks, so that lighted candles had to be used. A short time after our preparations were finished a shell fell on the upper deck, and injured four of the guncrew. Before their dressings were finished, the firing on both sides grew hotter and hotter ; and the wounded were being brought in one after another, when all at once a gunshot destroyed the ceiling of the surgery (upper deck), and glanced away. At 1.25 Captain Sakamoto and two of the guncrew were killed on the bridge, and two others were wounded. After this the wounded that were brought in from the upper and lower decks, were so numerous that we could not spare much time to any one individual. We could therefore only apply tourniquets to the wounds, and let slightly wounded men resume their duty, keeping only the serious cases in bed. At last by 2.30 p.m. the firing abated, and the wounded were each in his turn placed on the table ; and the character of each wound being well examined, the fragments of shell, pieces of iron and wooden splinters remaining in the wounds extracted. Presently the firing ceased entirely, and we proceeded to detailed operations. I may here remark though many shells struck around the surgery, yet happily none of them exploded in the surgery, and so our operations were not hindered at all. Most of the wounds were caused by shell fragments, death being in many cases instantaneous ; but none of the cases which came under treatment resulted in death. The wounds were mostly contused lacerations, sometimes accompanied by fractures. The edges of the wounds were often ragged, and at first not accompanied with much bleeding, as though the stopping of hœmorrhage had taken effect, but in a few hours, bleeding came on in several cases. Happily however the large blood vessels were in no case torn, though the surfaces of the wound were extensive. The method of treatment was uniform ;—that is, a strictly antiseptic method ; with the wounds having regular edges ; sutures were tried ; with the deep, large, irregular ones, in which primary union could not be expected, drainage tubes were introduced after adjusting the edges, and the wounds left open with blind wounds in which the inlets were all small, these were enlarged for the convenience of examining and extracting foreign bodies, and at the same time with a view to preventing any accumulation of the discharge afterwards. For probing the wounds for foreign bodies, fingers proved to be the best. The penetrating pieces of shell or iron, etc., were all irregular masses full of angles and apt to harm the surrounding tissues whilst being extracted. In time of battle, men are greatly excited and full of spirit, so there were very few cases in which an anœsthetic was needed. A violent shock was only found in one case of a wound in the chest.

By noon of the 18th, the treatment of all the sufferers had been finished in a general way. Of the killed and wounded mentioned above, 11 were killed outright and 17 were injured. We then took the wardroom, as a temporary hospital, and serious cases were removed there. On examination the temperature showed a rise in every case and the margins of the wounds exhibited signs of inflammation. On the 19th the temperatures showed an inclination to go down. On the same afternoon, the bandages were changed, and 10 serious cases sent on board the Genkai-Maru for the Sasebo Naval Hospital. The remains of the killed had on the 18th been cremated on land, when our ship returned to the Taidong river.

THE KILLED ARE AS FOLLOWS.

NAMES.	OFFICES.	PLACES WHERE THEY WERE INJURED.	NAMES OF WOUNDS.	CHARACTERS OF WOUNDS.
H. Sakamoto.	Captain	The bridge	Severance of the head.	Mutilation of head, except face and the base of the cranium.
T. Hashiguchi.	Midshipman	Fore-top	Perforated wound of the lumbar region with fracture of vertebrae.	The lumbar vertebræ and pelvis fractured; the spinal cord and aorta ruptured; the intestines protruding.
M. Hamada.	Junior chief carpenter	Lower deck	Penetrated wound of the cranium; rupture of the abdominal region.	The right temporal region perforated, and intestines and bladder coming out of the lower abdominal region.
K. Yasuoka.	Junior chief black-smith	,, ,,	Smashing of the head.	The head entirely smashed, leaving a part of occiput and lower jaw.
B. Miyamoto.	1st class seaman	The bridge	Severance of both thighs.	Both thighs severed, connected with legs only by small flaps of skin.
S. Watanabe.	2nd class seaman	Lower deck	Perforation of cranium.	Left parietal bone perforated and a shell lodged in cranium.
T. Matsunaga.	,, ,, ,,	Upper deck	,, ,, ,,	Right temporal bone perforated and a shell lodged in brain.
M. Umabuchi.	2nd class carpenter	Lower deck	Perforated wound of the lumbar region with fracture of the vertebrae.	The lumbar region being pierced, lumbar vertebræ fractured ,and many perforated wounds found on the back.
K. Tominaga.	2nd class cook	Upper deck	Severance of the head.	The upper half of the head smashed, leaving the lower half of the occiput at level with the base of nose.
S. Kusuki.	3rd class seaman	The bridge	Severance of the right thigh and the right side of pelvis.	The right thigh severed at the right side of pelvis and femoral vessels torn.
M. Obama.	4th class seaman	Upper deck	Perforated wound of the cranium.	Pierced from the middle of occiput to the middle of forehead.

(Only mortal wound or wounds of each stated here.)

For the conveyance of the wounded, hands were chiefly relied upon, for in a small ship like this, it was only descending a stair-case of 8 "shaku" at 20 "ken" from the remotest part of the bow, that the surgery could be reached. So it was far better to have the task done promptly with hands, than to waste time over providing apparatus. Besides, the use of stretchers in narrow places during the time of action is cumbersome. However, to convey the wounded from the fore part of the lower deck to the surgery at the rear, they had both to ascend and descend the stairs, as owing to the presence of the engine room in the waist, they had first to come to the upper deck from the fore part of the lower deck and then again to the after part of the lower deck, where the surgery was stationed. In this case, they were ordered to use truck-stays (an oblong canvas with poles passing through its ends) or simply to carry the wounded on the back by means of a rope.

At first there were only two bearers, who worked with great assiduity, but later on in the action as the numbers of the wounded increased, it was felt that they were not sufficient to meet the emergency. For, deafened by the roaring of the guns, and consequently unable to catch the customary signals and cries for help, they had to take the trouble of hurrying about in search of the sufferers. In my opinion, at least four carriers for every hundred men should be provided, it being always possible that the carriers may themselves be injured. During the hottest part of the battle, cooking can not actually be carried on, so all the stewards and cooks might take the duty of carriers. On consultation with the Captain, it was decided that henceforth in our ship the carriers should consist of a steward and four cooks assisted by six tackle-men. Again, in a hard fight like this, in which so many were wounded at one time, it was extremely difficult for one surgeon to give prompt and proper treatment to all, especially in the case of wounds requiring complicate operations with the administration of an anæsthetic.

Another matter that attracted our attention during the engagement was the great need of water. Whether the climate be cold or hot, men get exceedingly thirsty from over-exertion, and drinking water should therefore be abundantly provided on such occasions. In our ship during the preparations for the fight, copper vessels ordinarily used for serving boiled rice had been filled with water and placed at each gun. Besides this, a large quantity was required for washing wounds, etc., and it must be remembered that the quantity of combustible material, such as canvas, and wood, brings with it a great danger of conflagration which necessitates a liberal supply of water for its extinction.

The Saikio Maru. 1.—At 1.14 p.m. two 30.5 c.m. shells that came at the same moment, between the starboard main riggings, smashed the wardroom and several adjoining rooms, and then piercing through the port side, fell into the water some 20 meters off the ship's side.

2.—At 2.22 p.m. a couple of 30.5 c.m. shells rebounding from the water about 200 meters to the starboard, passed through the ward-room. One of them, breaking a starboard ventilator, exploded in front of the wardroom, smashing it as well as several other adjoining rooms, with the sky-light, hatch, and all the furniture ; the other split the steam-pipe and water-pipe connected with the steering gear, and passing just under the upper deck, pierced the deck, went through a cutter, and at last fell overboard. At the time, Chief Surgeon K. Tawara, who was at the entrance of the hatch to the wardroom, was thrown down on the stairs by the shock of the explosion and wounded. Also a captain's servant and a stoker, who were then at the same place, and two oil men, who were at the hatchway of the engine room, were slightly injured by wooden splinters.

3.—About 2.24 p.m., two shells, one of 12 c.m. and the other of 21 c.m. at the same time reached to the wardroom on the upper deck, from the starboard side, but passed away without exploding or producing any special damage.

4.—About 2.30 p.m., a 15 c.m. shell struck against the last boat-davit on the starboard quarter splitting it in two, and exploded there, shell fragments, broken iron pieces, wooden splinters flying in every direction over the uppermost deck. A quarter-master and two men of the 57 m.m. q.f.-gun, were injured.

5.—2.30 p.m., two 12 c.m. shells came from the starboard side and pierced the funnel.

6.—About 2.36 p.m., a 15 c.m. shell struck the ship at the water-line on the starboard side of the after part, but it had not sufficient force to penetrate through the side, only leaving a crack which let in a little water.

7.—About 2.40 p.m., a 12 c.m. shell, rushing in by the stern, exploded against a stanchion in the after part of the main deck. This terribly damaged the adjoining rooms, and set them on fire. It was however soon extinguished.

8.—About 2.42 p.m., a 12 c.m. shell (?) came from the starboard side and tore off the fore mast derrick. At the time, three of the gun crew in the fore part of the upper deck were injured by splintered wooden pieces.

Besides the above mentioned, several shell marks were left on the bowlight stand, fore-mast, flag-staff, chief engineer's room, funnel casing, main mast, ventilator and funnel. They were all certainly caused by shells from small calibre guns or by shell fragments.

3.—THE BOMBARDMENTS OF TANGCHOW.

Tangchow was three times bombarded; the first bombardment being made by the Yoshino, Naniwa, and Akitsushima of the First Flying Squadron, on January 18th and 19th, 1895. The enemy's forts replied to the bombardment with guns of small calibre and about 60 pounders. One of the 60 pounder shells, fired from a fort on Tangchow promontory, flew over the Yoshino, but all the rest fell short of our ships which sustained no damage.

The second bombardment was attempted by the Tenryū and Kaimon, belonging to the Third Flying Squadron, on the 26th of the same month; the Kaimon then received two shells: the one was a bomb-shell which burst over the ship, slightly tearing the ship's flag; the other was a shell from an eight c.m. field-gun which struck the upper part of the after-davit of the starboard galley, and, there exploding, broke the iron-band of the davit stay, cut off the boat-haul and injured the galley; at the same time one of its fragments grazed past the chest of a gunner at No. 5 gun, tearing his clothes, but doing no farther injury.

The third bombardment of Tangchow was made by the three battle ships; Tenryū, Yamato, and Musashi on the 21st of February. The enemy's forts replied to the attack with field guns and 12 c.m. guns; some of the shots fell in front or rear of the Musashi, but none struck any of our ships.

4.—THE ATTACK ON WEI-HAI-WEI.

From January 30th, 1895 the entire force of our Combined Squadron with the torpedo-flotillas belonging to them, made several attacks on Wei-hai-wei. The forts of Lieukung and Zhih islands assisted by the Chinese fleet in the port made a desperate but fruitless defence. On February 12th the enemy surrendered to our fleets. In this service our vessels were not all equally engaged : some served only a day, while others were engaged for several days in successive engagements. Consequently the damages sustained varied with each vessel. We subjoin lists of the numbers and ranks of the officers and men on board each vessel : of the dates when they were engaged in the fighting, and of the amount of damage sustained on each occasion.

OFFICERS AND MEN ON BOARD EACH VESSEL.

Name of Vessel.	Officers.	Engineers.	Surgeons.	Paymasters.	Seamen.	Stokers.	Medical attendants.	Paymasters assistants.	Total.
Matsushima	33	11	4	3	277	74	3	22	427
Itsukushima	25	10	3	2	229	74	3	18	364
Hashidate...	24	10	3	2	229	74	3	18	363
Yoshino	28	12	2	3	251	101	3	22	422
Naniwa	24	10	2	2	224	78	3	18	361
Takachiho	23	10	2	2	224	78	3	18	360
Akitsushima	23	10	2	2	180	85	3	18	323
Chiyoda	21	8	2	2	185	76	3	18	315
Tsukushi	15	6	2	2	93	48	2	14	182
Banjō	5	3	1	2	63	21	1	11	107
Maya	5	3	1	2	60	25	1	8	105
Atago	6	3	1	2	60	25	1	8	106
Chokai	6	3	1	1	60	25	1	8	105
Akagi	6	3	1	2	81	25	1	9	128
(The above formed the Standing Squadron.)									
Fusō	30	7	2	3	280	67	3	21	413
Hiyei	19	6	2	2	214	44	3	17	307
Kongō	19	6	2	2	214	44	3	17	307
Takao	16	7	2	2	138	47	2	14	228
Yamato	15	5	2	2	158	36	2	14	234
Katsuragi...	14	6	2	2	158	36	2	14	234
Musashi	15	5	2	2	158	36	2	14	234
Tenryū	13	5	2	2	133	32	2	14	203

Kaimon	14	5	2	2	130	32	2	14	201
(The above formed the Western Sea Squadron.)									
Kotaka	3	1	—	—	12	13	—	—	29
No. 5 boat...	3	1	—	—	5	7	—	—	16
No. 6 boat...	3	1	—	—	5	7	—	—	16
No. 7 boat...	3	—	—	—	5	7	—	—	15
No. 8 boat...	3	1	—	—	5	7	—	—	16
No. 9 boat...	3	1	—	—	5	7	—	—	16
No. 10 boat	3	1	—	—	5	8	—	—	17
No. 11 boat	3	1	—	—	5	8	—	—	17
No. 13 boat	3	1	—	—	5	7	—	—	16
No. 14 boat	3	1	—	—	6	7	—	—	17
No. 18 boat	3	1	—	—	5	7	—	—	16
No. 19 boat	3	1	—	—	5	7	—	—	16
No. 21 boat	4	—	—	—	6	8	—	—	18
No. 22 boat	4	1	—	—	7	8	—	—	20
No. 23 boat	4	1	—	—	7	8	—	—	20
(The above formed the Torpedo-flotilla.)									
Landing party to Luchohtsai forts ...	4	—	—	—	58	—	—	—	62
Total...	451	167	45	48	3,945	1,299	52	349	6,356

NOTE :—

Originally the Banjō's complement was 114, the Maya's 106, the Tenryū's 217, the Kaimon's 214, but 7 from the Banjō, 1 from the Maya, 14 from the Tenryū, 13 from the Kaimon, were sent to Luchohtsai as a landing party, therefore the above numbers were subtracted from the original numbers in each ship so that in the table we give 107 in the Banjō, 105 in the Maya, 203 in the Tenryū, 201 in the Kaimon, and the landing party despatched to Luchohtsai forts numbered 62 by the addition of 27 men from the three ships Yayeyama, Amagi and Oshima, to the 35 men from the above mentioned four vessels.

BOMBARDMENT ON JANUARY 30TH, 1895.		
NAME OF SHIP.	PLACE OF ATTACK.	RECORDS.
Hiyei	Zhih island	
Kongō	ditto	
Fusō	ditto	Compressor of a gun damaged.
Takao	ditto	
Kaimon	Off Kinshantsai	
Tenryū	ditto	
Banjō	ditto	
Yamato	Eastern entrance of Wei-hai-wei	
Katsuragi	ditto	
Musashi	ditto	
Akagi	ditto	
Maya	ditto	
Atago	ditto	
Chōkai	ditto	
Tsukushi	ditto	
BOMBARDMENT ON FEBRUARY 3RD, 1895.		
Hiyei	Zhih island	
Kongō	ditto	
Takao	ditto	Slight damage of the ship.
Tsukushi	ditto	Damaged; some killed and injured.
Fusō	Zhih and Liukung islands	
Yamato	ditto	
Katsuragi	ditto	
Musashi	ditto	
BOMBARDMENT ON FEBRUARY 5TH, 1895.		
Chōkai	Zhih island	
Atago	ditto	
BOMBARDMENT ON FEBRUARY 7TH, 1895.		
Matsushima	Eastern forts of Liukung island.	Damaged; some injured.
Chiyoda	ditto	
Itsukushima	ditto	
Hashidate	ditto	Damaged.
Yoshino	ditto	Damaged; some killed or injured.
Hiyei	ditto	

Takachiho	Liukung island	
Naniwa	ditto	Damaged.
Akitsushima	ditto	Damaged; some wounded.
Kongō	Zhih island	
Takao	ditto	
Fusō	ditto	Damaged; some of the crew wounded.
Kaimon	ditto	
Tenryū	ditto	
Yamato	ditto	
Musashi	ditto	
Akagi	ditto	
Tsukushi	ditto	
Maya	ditto	
Atago	ditto	
Chōkai	Zhih and Liukung islands	
BOMBARDMENT ON FEBRUARY 9th, 1895.		
Kaimon	Zhih island	
Tenryū	ditto	
Yamato	Eastern forts of Liukung island	
Katsuragi	ditto	Some slightly injured.
Musashi	ditto	
BOMBARDMENT ON FEBRUARY 11th, 1895.		
Kaimon	Eastern forts of Liukung island	
Tenryū	ditto	Damaged; some killed or wounded.
Yamato	ditto	Damaged.
Katsuragi	ditto	Damaged; some of the crew killed or wounded.
Musashi	ditto	Slightly damaged.
Hiyei	ditto	
Takao	ditto	
Fusō	ditto	
Naniwa	Kwang island	
Akitsushima	ditto	
BOMBARDMENT ON FEBRUARY 12th, 1895.		
Naniwa	Kwang island	
Akitsushima	ditto	

THE NUMBER OF SHELLS HIT AND OF THE KILLED AND WOUNDED.

(Of the torpedo-boats, the Kotaka received 1 or 2 rifle-bullets, No. 6 boat over 60, No. 10; 10, No. 23; 3 or 4, but as the injury was not noticeable in any case, no statement will be made in the table.)

Name of ship and boat.	Days of Bombardment.	Number of shells received.	Number of the killed.	Number of the wounded.	Total of the killed or wounded
Matsushima ...	1	1	—	3	3
Itsukushima ...	1	—	—	—	—
Hashidate	1	1	—	—	—
Yoshino	1	1	2	5	7
Naniwa	3	1	—	—	—
Takachiho ...	1	—	—	—	—
Akitsushima ...	3	1	—	2	2
Chiyoda	1	—	—	—	—
Tsukushi	3	1	1	7	8
Banjō...	1	—	—	—	—
Maya...	2	—	—	—	—
Atago...	3	—	—	—	—
Chōkai	3	—	—	—	—
Akagi...	2	—	—	—	—
Fusō	4	1	—	7	7
Hiyei...	4	—	—	—	—
Kongō	3	—	—	—	—
Takao	4	1	—	—	—
Yamato	5	2	—	—	—
Katsuragi	4	1	1	7	8
Musashi	5	1	—	—	—
Tenryū	4	1	5	6	11
Kaimon	4	—	—	—	—
Kotaka	1	—	—	—	—
No. 5 boat... ...	1	—	—	—	—
No. 6 boat... ...	1	1	—	—	—
No. 7 boat... ...	1	—	—	—	—
No. 8 boat... ...	1	—	—	—	—
No. 9 boat... ...	1	13	4	4	8
No. 10 boat ...	1	—	—	—	—
No. 11 boat ...	1	—	—	—	—
No. 13 boat ...	1	—	—	—	—
No. 14 boat ...	1	—	—	—	—
No. 18 boat ...	1	—	—	—	—
No. 19 boat ...	1	—	—	—	—
No. 21 boat ...	1	—	—	—	—
No. 22 boat ...	1	—	3	2	5
No. 23 boat ...	1	—	—	—	—
Luchoh tsai forts.	14	3	4	3	7
Total	92	30	20	46	66

As will be seen from the above table, the number of shells that hit our ships from the enemy's forts (forts of Liukung and Zhih islands) during the attack on Wei-hai-wei was just 30, by which 66 persons were killed or wounded. The courses of these shells, and the damage done by them, are as follows.

In the Tsukushi. While firing upon Zhih island on February 3rd, about 1.20 p.m., a 24 c.m. shot (?) that came over the port beam, struck through the lower part of the funnel (1.8 meter above the sea level), rent the upper deck of the starboard side, entered the scullery on the lower deck and passed through the starboard side. The raking missile shattered the bundles of iron poles for tents which were stacked on both sides of the funnel, the broken pieces of which, driven off in all directions, damaged a gig and a boat hung on the starboard side of the upper deck, killed one of the gun crew of the 9-pounder who was on the left side of funnel, and wounded two men on the right side of the said place so badly that they succumbed in the course of the day. Moreover, Assistant Paymaster Koike on the port side of the upper deck below the bridge and Midshipman Yotsumoto at the fore part of starboard side of the upper deck, a man of the port machine gun in the fore part of the upper deck and one of the crew of the starboard 9-pounder in the middle of the upper deck were wounded by the flying iron fragments. When the shot dashed through the kitchen a cook was wounded by the iron and wooden splinters.

In the Takao. During the attack on the forts on Zhih island, about 0.07 p.m., on the same day, a 12 c.m. shell severed the lower part (about 4.5 meters above the sea level) of the middle shroud of the port main rigging, breaking the metallic gears.

In the Matsushima. During the attack on the eastern forts on Liukung island, at about 7.40 a.m. February 7th, 1895, a shell of about 24 c.m. that fell on the sea some 200 meters off the port bow, rebounded and, battered the chart box, and mantelet upon the fore bridge, grazed the steam-pipe, knocked through the middle of the funnel, broke the awning stanchion outside the 1st port cutter, ridge-chain, the chain of the cutter-davit, aftermost haul, and upper block, the awning stanchion and awning ridge chain of the fore bridge, the foremost funnel-stay on the port side and the rail of the fore bridge, and then glanced away. Chief Navigating officer of the Combined Squadron, E. Takagi, Assistant Navigating officer R. Ishii, who were on the fore-bridge at the time, were injured, the former by wooden splinters and the latter by the grazing of the shell; and Midshipman S. Mori, who was in the conning tower, was injured by a flying iron fragment.

In the Hashidate. During the attack on the eastern forts of Liukung island on the same day at about 7 a.m., fragments of a 24 c.m. shell which exploded on the sea to the port side, damaged the outlet cover of the torpedo tube in the port bow (610 m.m. above the sea level).

In the Fusō. During the attack on the forts on Zhih island, about 8.40 a.m. a 12 c.m. steel-shell from a quick-firing gun, not furnished with an explosive, pierced the starboard side of the gallant forecastle, where it broke up and smashed the ladder. The head of the shell passed through the bellows on the fore part of the upper deck, hit the middle of the conning tower without passing through it, and rebounding dropped on the deck. One of the crew of No. 1 short 7.5 c.m. gun who was at his post, a man of the magazine party, a stretcher-bearer, who was then below the starboard side of the forecastle, one of the crew of No. 2 Hotchkiss gun who was near the bellows on the upper deck, and one of the crew of No. 1 Hotchkiss gun, who was on the bollard heads on the starboard side of the forecastle, were injured by shell fragments. A petty officer who was on a step of the ladder on the starboard side of the forecastle, and a signal man, who was on the starboard side of the foremast, were wounded by wooden splinters.

In the Yoshino. During the bombardment of the eastern forts of Liukung island on the same day, at 8.05 a.m., a shell that rebounded from the sea some 100 meters from the port beam, split the shield of No. 6 3-pounder above the middle part of the port netting (4.8 m. above sea level). One half of the shield being blown off, shattered the bottom of No. 2 cutter which was stowed on the booms above it, knocked down the stanchion of the flying bridge and lodged on the deck-house. Other fragments of the broken shield, flying in every direction, scathed several parts of the upper deck and damaged the walls of the deck house, while the shell itself went away without exploding. Two of the crew of No. 6 3-pounder were instantaneously killed by the broken pieces of the shield ; and one of the crew of the same gun, a gunner, and two men serving No. 6 12 c.m. gun, were wounded: a man belonging to the same gun was injured by the broken handle of an oar in No. 2 cutter.

In the Naniwa. While bombarding the fortresses on Liukung island on the same day, at 8.12 a.m., a 24 c.m. shell struck the ship at a spot a little below the coaling hole in the middle part of the port side (1 meter above the sea level), making an aperture 300 m.m. in diameter, and destroyed in succession the inner tube of the coaling hole, two of the deck plates in the room of the chief boatswain, 18 plates on the starboard side of the lower deck, the greater part of the chief carpenter's room, the flag-box furnished inside the starboard side and the coaling hole in the middle part of starboard side. The shell itself however glanced off to the starboard side without exploding. Not a man was killed or wounded.

In the Akitsushima. During the bombardment of Liukung island on the same day, about 9.10 a.m., a 15 c.m. shell crushed the stanchion extending from the poop-deck to the bridge (5.6 meters above the sea level) and exploded on that deck, when one of the crew of No. 7 gun, who was standing at its breach, and one of the crew of the stern gun, who was then at its side, were wounded by the exploded fragments.

In the Yamato. During the bombardment of the eastern forts of Liukung island on February 11th, about 11.10 a.m., two 12 c.m. steel shells (?) came at the same moment from the port bow at an angle of 30° with the long axis of the ship, the falling angle being 40°. One split the port after main-brace, and swept between the bridge and its tent, then destroyed the Nordenfelt gun on the starboard side of the bridge, and fell with it in a mass into the sea. The other piece pierced the galley suspended from the starboard davit, a little behind the middle part of the ship, and fell into the sea. Neither missile did any injury to persons.

In the Musashi. During the firing upon the eastern fortresses of Liukung island, about 11.15 a.m., a shell flew past over the ship, cutting off the starboard main brace on its way.

In the Katsuragi. While she was bombarding the eastern forts of Liukung island on the same day, about 9.15 a.m., a 24 c.m. steel shell hit the barrel of the bow gun (about 3.2 meters above the sea). One third of the barrel was broken off and thrown into the sea; at the same time, the shell was broken into fragments which damaged a half of the gun port and utterly destroyed the provision-store of the wardroom where a part of the broken pieces lodged. The other portion of the fragments killed one of the crew, and wounded another of the same gun, who were then at its side. Five others of the crew of the gun, were wounded by the shattered wooden splinters ; but happily the shell did not explode with violence, as it was not provided with an explosive.

Again, while firing upon the eastern forts of Liukung island, Lieutenant S. Kurita had his left foot run over by a gun wheel which recoiled from the shock of firing.

In the Tenryū. During the bombardment of the eastern forts of Liukung island on February 9th, about 11.10 a.m., a 24 c.m. steel-shell passed obliquely through the after part of the port hole of No. 2 12 c.m. gun on the middle part of the port side (about 3.2 meters above the sea level), and then fairly striking the mounting of the gun, exploded. Several fragments that flew in all directions, smashed the sky lights of the engine room, broke the upper deck for a space of 4.2 meter long, 2.4 meter wide, split two beams, fractured the lower part of the main-mast, tore an area of 1.8 meter in the starboard booms, crushing various implements stored therein, wrought slight damage in the covers of Nos. 1 and 2 hatches, rent the rails of No. 2 hatch, and bent those on the right side of the bridge, besides various minor damages to tackles and boats. The fragments that entered the lower deck destroyed the doors around the engine room and that of the boatswain's room, and broke the 7-inch Downton pump at the rear of the lower deck. At the same time, the fragments killed Commander S. Nakano on the starboard side of the conning tower of the bridge, a petty officer and three of the gun crew on the starboard side of the middle part of the upper deck and wounded three men who were all on the upper deck. The iron and wooden splinters injured Assistant Engineer T. Takano then in the engine room, and a man of the fire brigade, then on the middle part of starboard side of the lower deck. Moreover, an ammunition supplier, then in the after cock-pit on the lowest deck, got contused by a falling piece of the severed brass rod belonging to the rail of the hatch.

When the above mentioned shell reached the ship, only the bow gun happened to be firing. The side guns having suspended action, the gun-crews were dismissed for the time being, and consequently though the shell struck the mounting of No. 2 side gun and exploded, yet not one of its crew was injured, nor any one belonging to the other side guns. The rudder wheel was protected by a wall of large ropes, so the dispersed fragments could not do any harm to the wheel men nor to the rudder-wheel.

As regards the landing-party from the Tenryū, Kaimon, Amagi, Banjō, Yayeyama, Ōshima and Maya that had been sent beforehand to the occupied fort of Luchoh tsai at Wei-hai-wei, during the firing on the enemy's squadron anchored in the port of Wei-hai-wei :—on January 30th, 1895, about 4.30 p.m., a 30.5 c.m. shell from the Chinese vessel Ting-Yuen struck the barrel of the 24 c.m. gun on that fort and exploded; thus tearing the gun. The fragments of the exploded shell and barrel killed two men, and injured two. Next, during the bombardment on February 3rd, about 1 p.m., a shrapnel fired from the Sai-Yuen, exploding in front of that fort, killed a warrant officer, and a petty officer. Again, on February 7th, at the fort, while a seaman was on picket-duty, about 8 in the morning, a shell exploded at a distance of 2 meters from him. He was knocked over and received a wound in his right foot.

Night attacks by the torpedo-boats were made twice, on February

5th and 6th. Of the ten boats—Nos. 5, 6, 8, 9, 10, 14, 18, 19, 21, and 22—which constituted the attacking flotilla on the 5th, No. 9 boat received 13 shells large and small. Of these, a shell that struck her at 4.30 a.m. fairly struck the boiler and broke it ; the steam and boiling water gushing out of it, scalded eight persons belonging to the engineering party, of whom four died on the spot, two others expired in the course of that day and the next ; and the remaining two happily recovered. About 5 a.m., on the same day No. 22 boat got aground on a reef on her return from the attack, and being in the last extremity, Sub-Lieutenant T. Suzuki and a seaman plunged into the sea intending to swim ashore, but their limbs were so numbed by the cold that they were drowned. Two seamen and a stoker had their canvas boat upset while attempting to reach the shore: the stoker was frozen and drowned ; the other two managed to reach the Luchoh tsai fort in the possession of our army, but one man of them afterwards died from the long exposure to the cold. The other survived but suffered severely from frost bite. On the same day No. 6 boat received 1 machine gun shot and more than sixty bullets, and No. 10 boat 10 bullets.

In the attack on the 6th day, the Kotaka received 1 or 2 bullets and No. 23 boat 3 or 4 bullets. However, none of these missiles caused any noticeable damage to the boats, and there was no injury to men.

5.—THE STORMING OF THE PESCADORES.

On March 23rd, 1895 the Matsushima, Hashidate, Itsukushima, Naniwa, Takachiho, and Akitsushima belonging to the Combined Squadron arrived at the Pescadores, convoying five transports with a detachment of the army on board. They began by storming the Kon-peh-tai fortress on the south side of the islands, to which the enemy replied by firing their heavy guns. The battle lasted nearly five hours and resulted in the silencing and almost entire demolition of the enemy's fortresses. Meanwhile, the army detachment landing at Liseikaku in the main island advanced far into the interior. At dawn on the 24th, a landing party was sent from each warship to assist the army, and on the 25th, the enemy offering to surrender, the entire island was subdued.

Throughout the engagement, our fleet received no injury. However, a seaman belonging to the landing-party was wounded by the aimed shot of an enemy, while reconnoitring a native house at the Seishi-an village on the main island.

6.—BOMBARDMENTS AT OTHER PLACES.

Having finished the statements of the battles recorded in the sections 1 to 5, we ought now properly to report on the actions at Hwa-yuan-kow, Talien-bay, Port Arthur, Yin-shan Bay, and Keelung, Takow, Anping in Formosa. But as during these fights our warships suffered no injury that needs to be recorded, we will refer our readers for fuller particulars to other official papers.

CHAPTER II.

BRIEF HISTORY OF THE KILLED AND WOUNDED.

1.—INJURIES EXTENDING OVER THE WHOLE BODY.

1.—**Mutilation of the whole body**:—M. Tamamura, aged 33, crew of No. 7 Hotchkiss gun of the Matsushima ; in the battle of Yellow sea, on September 17th, 1894, he was firing on the fort of the gun on the starboard side of flying deck, amidships, when a shell exploded against the mounting of the gun ; he was struck by the large fragments of the shell and iron pieces, so that his whole body was smashed to pieces, death being instantaneous.

2.—K. Shima, Lieutenant of the Matsushima, aged 36 years ; in the same battle he was commanding the battery on the fore part of the lower deck when a 30.5 c.m. shell burst against the shield of No. 4 side-gun on the port side of the same deck, and, at that moment the ammunition provided for the side-gun was ignited, so that by the explosion his whole body was smashed to pieces.

The following 24 cases of mutilation of the whole body, on board the ship Matsushima, were caused by the same explosion as above :

3.—M. Ito, Sub-Lieutenant, aged 27 years, while commanding the battery on the fore part of the lower deck.

4.—K. Shigeta, petty officer of the Matsushima, aged 38 years, while standing along the fore battery on the lower deck.

5.—T. Maki, a gunner of No. 1 starboard side-gun on the lower deck, while standing by the gun.

6.—R. Matsumoto, crew of No. 1 side-gun.

7.—T. Terada, crew of No. 1 side-gun.

8.—C. Ōgusa, crew of No. 2 port side-gun.

9.—S. Takeshita, a gunner of No. 3 starboard side-gun.

10.—M. Ikeda, crew of No. 3 starboard side-gun.

11.—T. Fukuma, crew of No. 3 starboard side-gun.

12.—S. Nakamura, crew of No. 3 starboard side-gun.

13.—K. Yamashita, a gunner of No. 4 port side-gun.

14.—K. Nakamata, crew of No. 4 port side-gun.

15.—K. Amagoi, crew of No. 4 port side-gun.

16.—S. Tanaka, crew of No. 5 starboard side-gun.

17.—G. Ninakawa, crew of No. 7 starboard side-gun.

18.—I. Sasaki, crew of No. 9 side-gun, while near the magazine on the fore part of the lower deck.

19.—T. Hayashi, a fore magazine man, while lifting the ammunition from the magazine on the lower deck.

20.—K. Miyazato, a fore magazine man, while lifting the ammunition from the magazine.

21.—S. Takagi, a fore magazine man.

22.—Y. Masuda, a fore magazine man.

23.—G. Yamaguchi, a fore magazine man.

24.—J. Azuma, a fore magazine man.

25.—J. Kondō, a band man, while acting as a bearer of the wounded, beneath No. 1 hatch on the fore part.

26.—Y. Yoshida, a band man, while acting as a bearer of the wounded, beneath No. 1 fore hatch.

27.—H. Shimasaki, crew of No. 9 gun of the Hiyei, aged 29 years. In the same battle of the Yellow sea, he was on the fort of No. 9 gun, at the stern, where he was engaged in firing, when at about 1.18 p.m., a shell pierced through the aft and upper part of the stern port. The flying wooden splinters, inflicted a contused wound on the head, and he came down to the surgery in the ward-room on the lower deck. While he was lying on the deck another hostile shell exploded in that room. A huge fragment of the shell crushed his whole body.

28.—T. Sanno, crew of No. 5 side-gun of the Akitsushima, aged 28 years. In the same battle of the Yellow sea, he was on the fort of No. 5 side-gun on the starboard of the waist-deck, when at 1.09 p.m., a shell hit the shield of the same gun and exploded. A large fragment of the shell smashed his whole body to pieces.

29.—**Lacerated wounds in several parts of the body with burns of whole body**:—K. Danno, petty officer of the Hiyei, aged 30 years. In the same battle of Yellow sea, he was acting as a carrier to bring the wounded on the upper deck to the surgery on the lower deck. While he was standing in the room a 30.5 c.m. shell pierced through the starboard side of the stern and exploded there. He received serious lacerated wounds all over the head, face, trunk and limbs, and was burnt almost all over the body.

2.—INJURIES OF THE HEAD.

(A). INJURIES OF THE SCALP.

30.—**Abrasion of the scalp**:—U. Nishiya, aged 24, one of the torpedo-crew of the Itsukushima. On September 17th, 1894, he was on duty in the fore torpedo-chamber of the vessel, in the battle of the Yellow sea, when a shell exploded against the boom of the starboard torpedo-net; the fragments pierced through the ship's side into the chamber, one of which gave him an abrasion 1 c.m. long at the upper part of the right frontal eminence. Dry corrosive gauze was applied to the abrasion. On the 21st of the same month, he was sent to Sasebo Naval Hospital. On admission the lesion was almost dry, and in a short time healed under scabbing. He left the hospital on October 1st to resume service.

31.—Y. Yamamoto, aged 21, one of the Hotchkiss gun crew on the port side of the Hashidate. In the engagement of the Yellow sea, he was on the battery of the said gun in the fore part of the upper deck, when a shell burst in the turret of the bow gun: one of the fragments made an abrasion 1.5 c.m. long, at a point 3 c.m. behind the right mastoid process of the occiput. Dry corrosive gauze was applied and the wound healed by scabbing within a few days.

32.—M. Ogawa, aged 25, Sub-Lieutenant of the Hiyei. In the battle of the Yellow sea, he was passing the fourth quarter of the starboard side on the lower deck to superintend the fire brigade, when a 30.5 c.m. shell exploded in the ward-room, in the fifth quarter. Some of the fragments inflicted a small abrasion, below the occipital protuberance, and several others, which were dotted like scattered grains, on the left side of the face and the back of the left hand. The wounds soon healed up under corrosive gauze.

33.—K. Miyamoto, aged 20, one of the gun crew of the Hiyei: In the battle of the Yellow sea, he was engaged in firing No. 8 gun on the port side of the quarter deck, when a shell pierced the ship's side just behind the port hole of No. 7 gun. A wooden splinter inflicted an abrasion, 2 c.m. long, just above the external occipital protuberance. The wound was dusted with iodoform, dressed with corrosive gauze, and healed by scabbing in a few days.

34.—**Contused wound of the forehead**:—H. Sagara, aged 32, senior carpenter of the Matsushima. In the battle of the Yellow sea, while on duty as one of the fire brigade, he was passing the fore part of the lower deck, when a 30.5 c.m. shell exploded against the shield of No. 4 gun on the port side of the lower deck, one of the fragments inflicted a contused wound about 2 c.m. in diameter on the middle part of the forehead. In depth it reached to the periosteum, but the bone was not injured. After temporary dressing in the vessel, he was admitted on the 20th of the month, to Sasebo Naval Hospital, when granulation had already commenced so as to cover the surface of the periosteum without formation of pus, an antiseptic bandage was applied; the wound healed favourably and he was discharged on the 22nd of October to resume service.

35.—Y. Tanaka, Sub-Lieutenant of the Hiyei, aged 26. In the battle of the Yellow sea, a shell exploded in the ward-room and set the aft lower deck on fire. He was commanding the fire brigade near the stern battery, at the time when another shell broke through the starboard side of the stern, and one of the wooden fragments injured him with a contused wound on the right side of the forehead. As all the surgeons of the vessel had already been killed, he had to apply a bandage to the wound himself; first medical aid he received was from the surgeon of another vessel when the Hiyei arrived next morning at the rendezvous, near Cape Choppeki. There was an irregular contused wound on his forehead, a little to the right of the median line, which did not injure the muscle or bone; carbolic gauze was applied. On the 30th of the month, the surface of the wound was wholly covered with skin, but the epidermis was still thin and delicate, an elastic collodion was applied to the part and by October 12th it had completely healed.

36.—**Contused wound of the forehead with abrasion of both forearms**: —K. Kurokawa, one of the crew of No. 7 side-gun of the Matsushima, aged 26 years, 9 months. At the time of the engagement off the Haiyang islands, on September 17th, 1894, he was standing near to the starboard No. 7 gun on the fore part of the lower deck, when a 30.5 c.m. shell exploded against the shield of the starboard No. 4 gun on the same deck. Some of the small fragments inflicted several contused wounds: one 2 c.m. long at a point immediately above the occipital protuberance, another 10 c.m. long on the left side of the forehead, and a smaller one 3 c.m. long on the front part of the upper portion of the right fore-arm. There was also an abrasion on the outer side of the upper portion of the left fore-arm. Previous to this event, he had been under medical treatment for pleurisy which presented signs of aggravation after the injury. He was ordered to have rest, and corrosive gauze was applied to the wounds. On the 20th of the month, he was sent to the Sasebo Naval Hospital. The wounds of the head then healed up by scabbing; on the right fore-arm pus was slightly discharged; the wound was washed with sublimate lotion and dressed with corrosive gauze. Physical signs of the chest revealed dulness on the lower part of the right side, feeble respiratory sounds and diminished vocal thrill but the temperature was normal. Iodide of potassium was given. The wounds were completely healed by October 5th.

37.—**Contused wound of the left parietal region**:—K. Miyata, aged 24, one of the crew of No. 9 side-gun in the Matsushima: On September 17th, 1894, he was standing by No. 9 gun-battery, on the starboard side of the fore part of the lower deck, when a 30.5 c.m. shell exploded, hitting the shield of No. 4 side-gun on the port side of the same deck. One of the fragments, inflicted a small contused wound 2 c.m. long and 1 c.m. wide which was so superficical as not to reach beyond the cuticle. It was directly sealed with corrosive gauze and healed by scabbing by the 29th of the same month.

38.—**Contused wounds of the left parietal and left lumbar regions**:—D. Kobayashi, aged 21 years 5 months, one of the crew of No. 4 gun of the Hiyei: in the battle of the Yellow sea while firing the No. 4 side gun on the port side of the waist-deck, a shell came over the netting of the starboard waist, and broke through a pinnace and a steam launch on the booms, and exploded against the stanchion of the booms on the port side. Some of the iron and wooden splinters inflicted a contused wound of the size of a 5 *rin* copper coin at a point 4.5 c.m. above the left ear. The wound was superficial and did not pierce the pericranium. There were also small contused wounds on the left loin. They were dressed with corrosive gauze, and the patient was, on the 19th next, taken aboard the transport Genkai-maru bound for home and was admitted to the Sasebo Naval Hospital on the 21st of the same month At that time the wound of the head was forming a scab and those of the loin presented granulation with a slight discharge of pus. As a result of injury to the head there was anæsthesia and paralysis of the right side of the face, so that he could not close the right eye nor protrude the tongue perfectly. Speech was consequently difficult; there was also paresis of the extremities of the right side. This was perhaps owing to the fracture of the inner plate o. the parietal bone. After admission to the hospital the wounds were dressed antiseptically, and iodide of potassium was given internally. On the 30th he was removed to the Kure Naval Hospital where he was completely cured of the wounds as well as the paralysis and left the hospital on December 6th to resume his duty.

39.—**Contused wound of the right parietal bone and contusion of the right shoulder**:—K. Sera, aged 28 years 11 months, a seaman of the Saikyo-maru: in the battle of the Yellow sea while he was firing, 47 m.m. q.f. gun on the port side of the fore part of the upper deck, at the hostile torpede-boats, a shell flew in from the starboard side, and tore off the derrick of the fore-mast, a wooden splinter injured him on the head and shoulder. On examination, there were superficial contused wounds on the right parietal region and over the spine of the right scapula. Iodoform was sprinkled on the head wound and spirits of camphor was applied to the scapula. The wounds healed by the 21st.

40.—**Contused wound of the right temporal region**:—Y. Shimizu, aged 30 years and 8 months, a gunner attached to the No. 7 gun of the Hiyei: while he was in the battery of No. 7 gun on the starboard side of the quarter deck, engaged in firing at hostile vessels in the same battle, a shell perforated the bulwark just behind the gun-port, the wooden and iron platings being thus smashed. One of the wooden splinters inflicted a contused wound 1.5 c.m. in length, 1 c.m. in width, and 1.5 c.m. in depth, which ran down towards the back from the fore and upper part of the right temporal region. Bleeding was not profuse, the temporal artery having escaped injury. Corrosive gauze was applied; and by the 20th of the same month, a small spot of suppuration was found on the surface of the wound; granulation however was red and well developed. The wound was washed with carbolic lotion to remove the pus and then covered with corrosive gauze. By the 25th, the surface of the wound had diminished in size and by October 2nd, had healed by cicatrization.

41.—K. Takenishi, aged 21 years 10 mouths, seaman of the Hiyei: in the battle of the Yellow sea, he was engaged as a magazine-man in lifting shells at the entrance of the magazine in the third quarter of the lower deck, when a tremendous shell exploded in the ward-room. One of the flying pieces inflicted a contused wound on the upper margin of the right temporal region. Though the wound reached the bone yet there was no fracture. However, the tips of the left fingers were affected with anæsthesia and paresis. The patient, after temporary treatment in the vessel, was admitted to the Sasebo Naval Hospital on the 21st of the same month, where after some days the pain of the wound was much relieved. When he was removed to the Kure Hospital nine days afterwards, the wound of the scalp was almost covered with newly developed skin, leaving a mere spot of granulation at the centre, but the numbness of the fingers still continued though much diminished. The surface of the wound was anointed with zinc ointment and a mixture of iodide of potassium given internally. On October 6th, the wound healed by scabbing, followed by a subsidence of the paresis of the fingers. By October 10th, he had completely recovered and left the hospital to resume his former service.

42.—**Contused wound of the right mastoid region**:—I. Fukazawa, aged 24, an oil man of the Saikyo-maru, in the same battle with the above, was standing near the entrance to the engine-room as a relief-hand, when two 30.5 c.m. shells entered the ward-room on the upper deck and simultaneously exploded in front of the ward-room on the port side. Fragments of the shells and pieces of wood were pushed about, one of which inflicted a wound on the head just over the mastoid process. On examination the wound was found to be shallow and the bleeding and pain very slight, iodoform was sprinkled over it and it was covered with adhesive plaster. It had healed by scabbing by the 20th of the same month.

43.—**Gutter wound of the left parietal region**:—M. Kawamitsu, aged 20, a magazine man of the Hiyei: during the battle of the Yellow sea, he was working at the entrance of the magazine under the lower deck, when a 30.5 c.m. shell exploded in the ward-room, one of the fragments came crashing through the deck and inflicted a wound on his head. On examination a groove wound 3 c.m. in length, 1 c.m. in width and in depth was found on the right parietal region. It was irregularly lacerated on its edges presenting a ragged appearance, at the bottom of it an irregular wedge-shaped fragment of the shell, of the size of a bean, was perceived but the bone was intact. The fragment was extracted and an antiseptic dressing applied. On the 28th of the same month, granulation developed and the discharge of pus had almost ceased. On October 8th, the wound healed up by a cicatrix.

44.—**Penetrating wound of scalp and neck; burns of face and neck; rupture of both tympanic membranes**:—N. Kususe, aged 31, torpedo crew in the fore part of the Itsukushima. In the same battle with the last, he was busily loading the torpedo in the chamber, when a shell exploded against the boom provided for the use of the torpedo-net on the side, some of the shell fragments that entered the torpedo-chamber inflicted several injuries upon him: two contused wounds, one 5 c.m. and another 2 c.m. long, over the sagittal suture of the skull. These were not deep enough to pierce the occipito-frontalis; but in the wounds small fragments of the shell were found and extracted. He got a superficial burn too, extending from the right side of the head to the right half of the face and down to a part of the neck; grains of powder intruded into the skin, the hair was also scorched. Again, there was a small wound below the right mastoid process; when probed, a foreign body was found which, being extracted, turned out to be a wooden splinter 3 c.m. long. An antiseptic dressing was applied, and the patient was sent to Sasebo Naval Hospital on the 21st of the same month. On examination in the hospital, perforation of the membrana tympani of both ears besides the said wounds was discovered. He was removed to Kure Naval Hospital. The wounds of the head healed at the beginning of November, but the lesion of the membrana tympani remained up to the middle of December, leaving the thickenings of membrana tympani and dulness of hearing. On December 23rd, he left the hospital to resume his service.

(B). INJURIES OF THE HEAD ACCOMPANYING THE FRACTURE OR CEREBRAL LESIONS.

45.—**Compound fracture of forehead**:—C. Yamakawa, aged 25, a magazine man of the Fusō. During the bombardment of Zhih Island on February 7th 1895, he was standing under the starboard forecastle, when a shell exploded through the gallant-forecastle, some of the flying pieces of the shell inflicting three lacerated wounds on the forehead: the first about 6 c.m. long parallel with the right eyebrow; the second 1.5 c.m. long near the margin of the hair in the middle of the forehead; the third 4 c.m. long on the part a little to the left of the second one. Through the wound lacerated cerebral substance streamed out together with venous blood which probably came from the venous sinuses inside the skull. The frontal bone was badly severed. He uttered only one or two words at the time the blow was received and immediately became unconscious, stertorous respiration was present exhibiting symptoms of compression of the brain. Antiseptic dressings were applied, and he was placed in perfect rest; but expired after two hours and a half from coma.

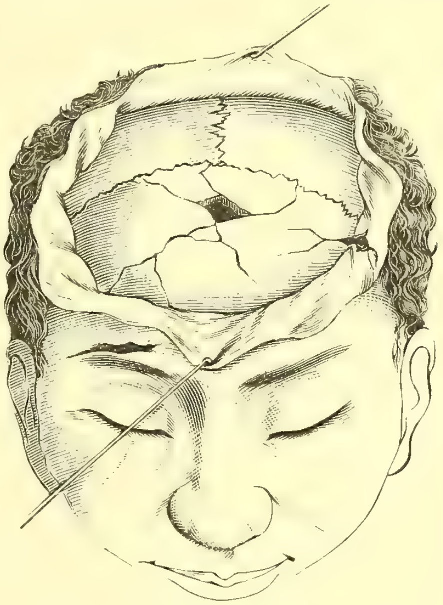


Fig. 1.—Cracks in the forehead.

On post-mortem examination, the frontal bone was found to be irregularly cracked with a lacerated hole; the internal table was seriously severed and some of the fragments being free, the anterior fossa of the cranium was seen to be heavily mutilated (See illustration No. 1.)

46.—**Compound fracture of forehead and left forearm**:—K. Moriya, aged 28, crew attached to No. 6 three pounder of the Yoshino. While bombarding the eastern fort of Liukung island on February 7th, 1895, a shell hit against the shield of No. 6 three pounder lying on the port netting of the waist deck. The fragments of the mutilated shield destroyed the upper half of his frontal bone and mutilated the left forearm. He died on the spot.

47.—**Compound fracture of forehead with burns of face**:—U. Hattori, aged 31, a petty officer of the Hiyei. During the engagement in the Yellow sea, he was standing at his post at the relieving-tackle in the cabin on the stern of the lower deck, when a shell burst in the next ward-room, splintering the walls and deck. He sustained a lacerated wound, running obliquely upwards from the upper part of the left orbital ridge; at the same time he got a burn from the exploding flame which extended over the right half of the face. All the surgeons of the vessel having being killed by the same shell, he had to be temporarily dressed by his mates, and received treatment for the first time on the following morning when the vessel cast anchor in the station near Cape Choppeki. The condition of the wounds was as follows: the laceratedwound on the left side of the forehead was 7 c.m. long in S-shape, in depth it reached to the bone, resulting in the crack of that bone. The burn on the right half of the face was of the first degree. The patient complained of a marked loss of the left eye sight. Antiseptic dressing was applied, and he was sent to the Sasebo Naval Hospital on the 21st of the same month. When examined on admission, the pupil of the left eye was dilated and the hæmorrhage of the retina was found to be such that objects could hardly be distinguished by the patient.

A wet compress of boracic lotion was applied to the eye; a carbolic gauze to the wound of the forehead, and boracic acid and olive oil to the burn. The burn healed on the 13th day following, and the head wound was almost healed, but the symptoms of the left eye remained unchanged. He was removed to the Kure Naval Hospital and on October 7th, the sight of the left eye had somewhat improved, the vision showing $\frac{20}{100}$ and the visional field being 12° above, 15°.7 below, 13°.8 outward and 14°.5 inward. The fundus presented marked hæmorrhagic patches. The vision of the right eye was not much interfered with but the field was markedly contracted viz: 14°.7 above, 17°.5 below, 17°.7 outward and 16°.8 inward. The wound of the forehead was contracting by the development of granulation; internally, iodide of potassium was administered. From that time the wound gradually healed up with an ugly cicatrix on the left forehead. However, the sight of the left eye was not improved, the vision still remained $\frac{20}{100}$, so that the fingers could hardly be counted at a distance of 4 feet; the field of vision was decreased to 20° (above), 30° (below), 30° (inward), and 20° (outward). Thus being disabled for the service, he was invalided on February 4th 1895 for life. He was, according to regulations, granted a pension.

48.—**Compound fracture of the left parietal bone**:—E. Isobe, aged 26, captain's steward of the Hashidate. At the time of the battle of the Yellow sea, he was assigned the duty of stretcher-bearer, while standing at the left side of the turret of the bow-gun, a shell burst in it, one of the fragments inflicting a lacerated wound 3 c.m. long, over the left parietal eminence. The wound reached down to the bone, separating the periosteum and breaking the outer table of the bone, but without cerebral symptoms at all. An antiseptic dressing was applied; the patient was sent to the Sasebo Naval Hospital on the 21st. At the time, edges of the soft part of the wound were lacerated, and a free fragment of bone was recognised at the bottom. So the hair of that part being shaved and antiseptic precaution being taken, the sequestrum was extracted; an iodoform gauze was applied; and the case progressed favourably. By October 22nd, granulation had developed so as to wholly cover the bone, and by November 20th, the pus discharge had entirely ceased; granulation grew smooth and contracted, ointment of boracic acid was applied; and the cicatrix formed on December 10th. He left the hospital completely recovered on the 14th of the same month.

49.—**Compound fracture of head and right upper extremity with penetrating wound of abdomen**:—S. Asao, aged 27, Sub-Lieutenant of the Yoshino. In the battle of the Yellow sea, he was standing in the stern of the upper deck, on the port side, in command of shell carriers, when a hostile shell came through the starboard netting and hitting two 12 c.m. shells arranged on the deck exploded all three at once. One of the flying fragments struck him in the middle of the forehead breaking the bone as follows:—length 15.5 c.m., width 6 c.m. and extending to the vertex over the coronary suture; a part of the brain escaping from the wound. Other fragments inflicted two contused wounds, each of the size of one *sen* copper coin: one about the middle of the outer side of the right upper arm, and one on the back of the right elbow joint breaking the olecranon process and the internal condyloid eminence of the humerus. Again, a penetrating wound 3 c.m. in diameter was inflicted on the left side of the epigastric region. He became quite unconscious; respiration was feeble, indicating little vitality. He was taken directly to the surgery on the lower deck and given perfect rest, but he expired about an hour after the accident from coma.

50.—**Compound fracture of the forehead** :—M. Yamashiro, aged 28, a man of No. 6 three pounder in the Yoshino. During the bombardment of the eastern fort of Liukung island on February 7th, 1895, he was standing by the side of No. 6 three-pounder on the netting of the port side of the waist, when a shell struck against the shield of the gun. The shell itself did not explode, but the shield was smashed into pieces. One of these pieces inflicted a lacerated wound in the middle of the coronary suture ; the bone of that part and the left orbital plate were fractured, the brain was crushed, and the man killed on the spot.

51.—**Compound fracture of the head, face and left upper arm with contused wound of chest and left leg** :—K. Ushijima, aged 21, a seaman of the Yoshino. At the time of the engagement in the Yellow sea, September 17th, 1894, he was standing, as a shell-carrier, between the right and left ventilators on the upper deck of the after quarter, when a shell pierced through the starboard netting and striking against two 12 c.m. shells placed side by side on the inner side of the netting. All three shells exploded at once. One of the fragments, inflicted a fracture of the frontal bone 6 c.m. long and 3 c.m. wide which ran obliquely from the left side of the forehead to the region over the coronary suture. Brain substance came out of the wound and he died on the spot. Besides, there were found many other contused wounds, some with fracture : several on the forehead, one over the left canthus, another over the right corner of the mouth, and others over the middle of the chin and on the right malar region ; the face was blackened all over by the explosion of the gas. On the chest again, there were several others reaching down to the ribs. There were also : simple fracture at the middle of the left humerus, a compound fracture of the left forearm, and burns of both legs with a lacerated wound on the outer side of the left leg.

52.—**Contused wound of forehead with a fracture of the base of the cranium** :—K. Odajima, aged 19, a cook of the Fusō. In the attack on the forts of Zhih island on February 7th, he was standing under the starboard forecastle as carrier of the wounded, when a hostile shell passed through the gallant-forecastle and burst. He was wounded on the left side of the forehead. It was a crescent-shaped lacerated wound 6.5 c.m. long, running from a point about 3 c.m. above the outer end of the superciliary ridge, upward and inward ; it terminated beyond the margin of the hair. At the bottom of the wound, the periosteum was stripped off, but the bone was left intact. The wound was sutured with two stitches, and an antiseptic bandage was applied. After a short while, epistaxis and hæmatemesis occurred suggesting a fracture at the base of the cranium. At first, the mind was clear but afterwards symptoms of cerebral excitement ensued ; the patient, bending his body would roll on his sides, and fall into lethargy, with occasional delirium. On the 8th next, these signs remained the same, and he was removed to the hospital ship, Kobe-maru. When examined there, he was in a comatose condition, the face flushed and the pupils contracted a little, dull of reaction to the light, with incontinence of urine. Bandage was renewed and a mixture of bromide of potassium and sulphate of magnesium given internally. On the 9th inst., the bandage was changed, the stitchings were removed, as the wound began to suppurate. On the 13th, the discharge of pus from the wound became profuse, and by the probing of the wound from its upper corner, it went beneath the scalp 6 c.m., the temperature was 38° C. ; brain symptoms were the same as those on the previous day ; a counter opening was made at the bottom of the wound and a drainage tube introduced. On the 16th, the brain symptoms seemed to have somewhat subsided, the delirium and incontinence of urine nearly ceased. On the 20th, the patient was admitted to Sasebo Naval Hospital. At that time, the wound on the left forehead was wide open, exposing the bone stripped of its membrane, and discharging pus freely ; the brain symptoms still continued ; the patient was almost unconscious with occasional delirium ; the pupils contracted. An ice bag was applied to the head and a saline purgative was given. On the 22nd, the senses became much restored and the discharge of pus decreased. On the 25th, an opening was made in the scalp over the region of the coronal suture where the pus accumulated, through the patient having to lie on his back all the time. On the 28th, the granulation developed to such an extent that the exposed bone was at last covered ; pus discharge became less and less ; the mind gradually enlivened, headache disappeared, but giddiness prevented him from standing up. March 5th : all the symptoms subsided ; iodide of potassium was given internally. April 7th, the wound contracted to a small granulating surface and the discharge of pus entirely ceased, experiencing no giddiness when he stood up, the patient began to try to walk. On the 14th, the formation of the skin over the wound was completed, and a protecting bandage only was applied. From that time, the body daily increased in strength, so that he could walk with ease. On May 15th, he was removed to Yokosuka Naval Hospital where tonics and nutritious diets being employed, he fully recovered on June 1st and returned to his former service.

53.—**Compound fracture of the face and base of cranium** :—K. Kanai, aged 24, 1st class seaman of the Hiyei, was, during the battle of the Yellow sea, standing in the surgery, where he, as a stretcher-bearer, had carried an injured man, when a 30.5 c.m. shell piercing through the starboard side exploded in the room. Some of its fragments, mutilated his face and the base of the cranium. He was killed on the spot.

54.—**Compound fracture of the face, base of cranium and both extremities** :—T. Oya, aged 23, a junior carpenter of the Hiyei. In the engagement of the Yellow sea, he was, as a member of the fire-brigade, standing by No. 5 pump, in front of the paymaster's office in the fourth division of the lower deck, when a 30.5 c.m. shell exploded in the ward-room in the fifth division. He was hit by some of the flying fragments, receiving a compound fracture, extending from the face to the cranial base and several other wounds on the upper and lower extremities. He died immediately.

55.—**Penetrating wound of the cranium** :—H. Ota, aged 26, a petty officer of the Itsukushima. In the same battle, he was on the fore part of the upper deck, when a shell exploded through the netting in the fore part of the port side. One of the broken pieces penetrated his forehead and lodged in the brain killing him on the spot.

56.—Y. Takahashi, aged 36, Lieutenant of the Hashidate. In the naval fight of the Yellow sea, he was commanding in the tower of the 32 c.m. gun in the fore part of the upper deck, when a shell from the starboard after quarter hit against the inner wall of the gun-shield and exploded just over his head. The fragments struck his head causing several penetrating wounds of the skull. He died immediately.

57.—K. Senokuchi, aged 29, Lieutenant of the Hashidate. During the naval battle of the Yellow sea, he stood in the tower of the 32 c.m. gun in the fore part of the upper deck, and was about to give orders to aim at a hostile ship, when a shell struck against the inner wall of the shield and exploded just over his head; pieces of the shell inflicted several penetrating wounds of the skull in the region of the forehead and the temple, which killed him on the spot.

58.—G. Hiroshige, aged 26, a gunner of the 32 c.m. bow-gun of the Hashidate. In the battle of the Yellow sea, he was handling the revolving wheel in the tower of the 32 c.m. gun in the fore part of the upper deck, when a shell exploded against the inner wall of the shield of that gun, some of the shell fragments struck him on the head inflicting several penetrating wounds of the skull. He died on the spot.

59.—T. Uchizaki, aged 26, Sub-Lieutenant of the Fusō was, in the battle of the Yellow sea, standing, in command of the port battery, under the booms of the upper waist-deck, when a shell pierced through the water way of the upper deck, and burst against the booms and iron pillar of the port side. By one of the fragments, he sustained a penetrating wound just midway between the right frontal eminence and the coronal suture. The lesion was an irregular lacerated wound 2 c.m. long and about half as wide, with a round hole about 1 c.m. in diameter in the frontal bone, no cerebral symptoms were present. The wound was directly cleansed and a corrosive gauze applied. On the 21st, the patient was sent to the Sasebo Naval Hospital. The surface of the wound was at the time covered with healthy granulation, but insomnia was present. On examining the wound, the whole thickness of the cranium was found to be perforated, but where the foreign body was lodged could not be ascertained. The temperature indicated 38.° 5 C., the hair around the wound was shaved off; antiseptic precautions being most carefully obserevd. The patient was kept perfectly quiet. On the 28th, he complained of giddiness, headache and a slight nausea with disturbed sleep during the night. The wound however presented no bad signs, the temperature having reached to normal from September 23rd, an ice-bag was applied to the head, calomel purgatives and occasional administrations of hypnotics were resorted to. On October 7th, the headache entirely disappeared and the spirits became enlivened, with increased appetite. On the 16th, there was occasional complaint of tinnitus aurium; the temperature normal, the pulse slow, counting 55; a mixture of bromide of potassium and iodide of potassium was administered internally. November 2nd, giddiness, tinnitus aurium aggravated with chills and fever; the temperature showing 38°.3C. The wound had been discharging a slight pus for some days, so bandage was renewed daily and ice was continuously applied to the head; cerebral symptoms, however, indicating compression of the brain became apparent. On the 7th next, trephining was performed under strict observance of antiseptic measures. In the frontal fossa an abscess was formed which discharged a thick yellow pus and yellowish serum, but the situation of the foreign body could not be ascertained. The pus cavity was washed out with a solution of boracic acid and a drainage tube introduced. The antiseptic dressing was changed everyday. After the operation the subjective symptoms were much relieved, the temperature stood at 37.°5 or 37.°6C.; but on the 10th, it rose to 39°C. and the patient became unconscious : the eyes were fixed obliquely, the pupils unequal, the right small and the left large ; the pulse grew soft and feeble counting 148 ; respirations stertorous, with frequent hiccoughs, and numbering 50 per minute. At 4.15 p.m. on the 11th, he died of coma. (See the illustration appended.)

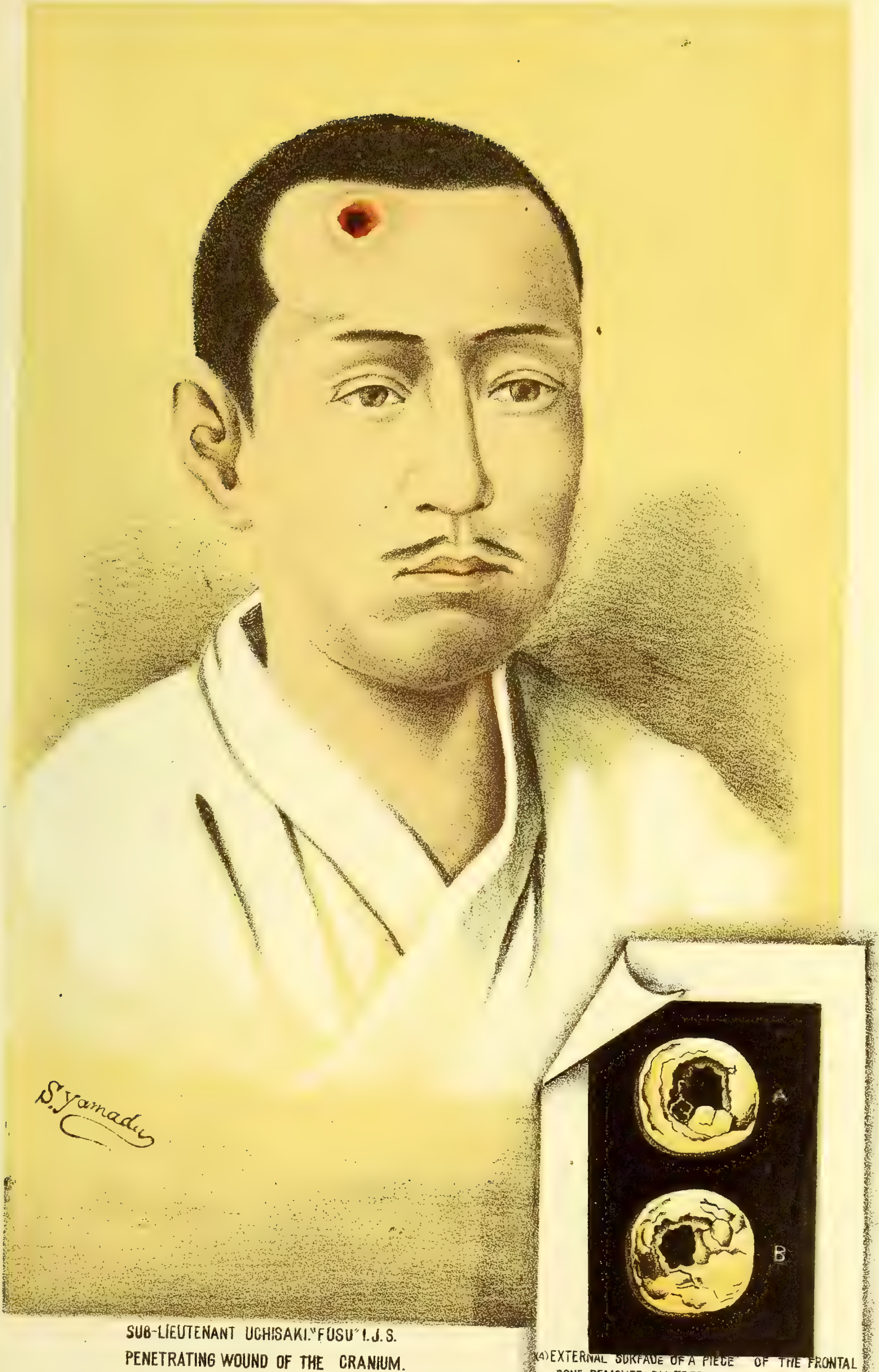
60.—K. Kimura, aged 21, signalman of the Fusō, during the battle of the Yellow sea, was blowing a bugle signal, standing by the left side of the funnel casing, when a shell pierced through the lower part of the funnel, one of its pieces penetrating into the cranial base through the left side of the nape. The brain being thus smashed, he died instantaneously.

61.—K. Nakagawa, aged 27, a cook of the Hiyei. At the battle of the Yellow sea, he was lifting up shells at the entrance of the machine-gun magazine, below the ward-room of the lower deck, when a 30.5 c.m. shell exploded in the room and broke the deck. One of the fragments of the shell, in falling, inflicted a penetrating wound on his forehead. He became semiconscious and complained of a burning sense in his back. He finally expired from coma forty minutes after the injury.

62.—T. Matsunaga, aged 25, seaman of the Akagi. In the engagement of the Yellow sea, he was at work, as a pumper, turning the Downton pump in the fore part of the upper deck, when one of the fragments of a hostile shell that flew in from the starboard side gave him a penetrating wound at the right temporal region ; the fragment remaining in the brain, he died on the spot.

63.—S. Watanabe, aged 27, seaman of the Akagi, in the naval fight of the Yellow sea, was, as one of the fire-brigade, standing in the fore part of the lower deck, when a shell exploded on the same deck, and one of the fragments, inflicted a penetrating wound of the skull at the left parietal region. The fragment being lodged in the brain, death was instantaneous.

64.—K. Kawamura, aged 19, a seaman of the Tenryu. On January 30th, 1895, while he was firing from the captured fort of Luchotsai at Wei-hai-wei, a shell struck against the barrel of the gun and broke it in two, the shell exploding at the same moment. A fragment of the shell inflicted a penetrating wound of the left temporal region. The wound in the soft part was of an irregular form, 4.5 c.m. in its longest diameter ; the cranium was broken into several pieces, some of which were pressed down into the cranial cavity and the brain thereby severed. Death was instantaneous.



SUB-LIEUTENANT UCHISAKI. "FUSU" I.J.S.
PENETRATING WOUND OF THE CRANIUM.

(A) EXTERNAL SURFACE OF A PIECE OF THE FRONTAL BONE REMOVED BY TREPHINING.
(B) INTERNAL SURFACE OF THE SAME.

65.—**Penetrating wound of the cranium and mutilation of right thigh.**—I. Sanada, aged 26, one of the crew of the No. 7 light Hotchkiss gun on the Matsushima, in the battle of the Yellow sea, was firing the gun on the starboard side at the middle of the flying deck, when a shell exploded against the mounting of the same gun. Some of the fragments of the shell inflicted a penetrating wound on the left side of his forehead, at the same time mutilating the upper portion of the right thigh. He was killed on the spot.

66.—**Penetrating wound of the cranium and mutilation of the abdominal wall.**—M. Hamada, aged 27 senior carpenter of the Akagi, in the same battle, was standing as one of the fire-brigade on the fore part of the lower deck, when a shell exploded on the same deck. Its fragments gave him a penetrating wound of the skull in the right temporal region and mutilated the lower portion of the abdominal wall so that his bowels and bladder protruded. He died on the spot.

67.—**Perforating wound of the cranium.**—M. Kohama, aged 21, seaman of the Akagi, in the engagement of the Yellow sea, was, as a pumper, engaged in turning the Downton pump on the fore part of the upper deck, when a fragment of a shell came in from the starboard side and inflicted a perforated wound from the external occipital protuberance to the spot between eye-brows, which of course caused instant death.

68.—**Mutilation of the head.**—S. Matsuo, aged 29, a magazine man of the Itsukushima, during the combat of the Yellow sea, was at work in the torpedo-room in the fore part when a shell burst against the boom provided for the use of the torpedo-net on the outer side of the ship, and crushed the side opposite to the torpedo-room. One of the fragments of the shell severed the front part of his skull so as to cause instant death.

69.—S. Arimatsu, aged 24, a magazine man of the Hiyei. In the battle of the Yellow sea, he was busy lifting up shells at the entrance of the machine-gun magazine below the ward-room. A 30.5 c.m. shell exploded in the ward-room on the lower deck, and by one of the fragments that came through the deck, he had his skull mutilated so completely that the brain was smashed. Death was instantaneous.

70.—K. Chikamatsu, aged 21, a magazine man of the Hiyei, during the fight in the Yellow sea, was lifting up shells at the entrance of the musket-shot magazine below the ward-room when a 30.5 c.m. shell exploded in the ward-room on the lower deck. Some of the pieces struck his head and scattered the brain substance, so that death was instantaneous.

71.—H. Nishihara, aged 21, one of the crew of No. 9 gun of the Hiyei, in the fight of the Yellow sea. While firing the gun, a shell passed through the starboard sea-port on the stern; and during its passage to the stern port, he was struck by the shell and had all his skull mutilated except the base, so that the cranium as well as the brain were blown off. He died immediately.

72.—S. Nakamuta, aged 24, one of the crew of No. 5 side-gun of the Akitsushima, in the engagement of the Yellow sea, was carrying shells in the neighbourhood of the starboard No. 5 side-gun on the waist-deck, when a shell exploded against the shield of that gun, and one of the fragments, smashed his cranium so that the brain was scattered. He died immediately.

73.—Y. Karikawa, aged 22, one of the crew of No. 5 side-gun of the Akitsushima, in the battle of the Yellow sea, was gathering empty cartridges on the fort of the starboard No. 5 side-gun of the waist-deck (in a bent posture), when a shell exploded against the shield of that gun. One of the fragments completely destroyed his skull.

74.—H. Sakamoto, aged 40, Commander of the Akagi, in the battle of the Yellow sea, was inspecting the chart on the chartstand of the bridge, when a shell came through the stern and burst against the stand of No. 1 Q. F.-gun on the starboard side of the bridge. He was struck by one of the broken pieces, on the posterior part of the parietal region, so that whilst the face and cranial base were spared, the whole vault of the skull was destroyed and his brain completely dashed out and scattered. Death was instantaneous.

75.—K. Nagatomi, aged 28, a cook of the Akagi, in the battle of the Yellow sea, was busy turning the Downton pump, in the fore part of the upper deck, when a fragment of a shell came through the starboard side, destroying the upper half of his cranium, leaving the lower half of the occipital bone.

76.—K. Yasuoka, aged 35, senior blacksmith of the Akagi, in the engagement of the Yellow sea, was, as one of the fire brigade, standing in the fore part of the lower deck, when a shell burst there. One of the broken pieces struck his head, and almost entirely destroyed it, leaving only a part of the occipital bone and lower jaw. He died immediately.

77.—K. Shimada, aged 21, one of the crew of the small-calibred machine gun of the Tenryu, at the time of the bombardment of the eastern fort of Liukung island, was standing at the gangway in the starboard-waist of the upper deck, when a shell burst striking a part of No. 2 side-gun on the port. One of the fragments smashed the whole of his skull blowing away the brain.

78.—**Mutilation of the head with Compound fracture of Cervical vertebræ.**—M. Sakata, aged 24, one of the crew of the No. 2 long 7.5 c.m. gun of the Fusō, in the battle of the Yellow sea, was at rest cross-legged near the left side of the funnel-casing when a shell pierced through the lower part of the funnel, and some of the broken iron pieces crushed the occipital, the temporal, and the parietal bones, with the whole encephalon and the portion from the vertex to the left clavicular region as well as the upper half of the cervical vertebræ. He died on the spot.

79.—**Lacerated wound of the head and right upper extremity with compound fracture of the left lower limb.**—I. Kawamura, aged 27, one of the crew of the revolving gun in the fore part of the Katsuragi, during the attack on the eastern fortress of Liukung island on February 11th, 1895, was working the gun, when a shell burst against the barrel. Some of the pieces crushed the upper part of his head leaving only a part of the lower jaw and occipital bone. The right shoulder joint was also so severely torn that it hung by a mere strip of muscle and skin ; the left knee joint was torn open, so that the patella protruded ; and a compound fracture of the left femur was sustained. He was killed instantaneously.

80.—**Severance of the cranium with lacerated wounds in both feet.**—S. Mizushima, aged 28, a seaman of the Amagi, on January 30th 1895, was firing on the enemy's vessels in the harbour, from the occupied fort of Luchotsai at Wei-hai-wei, when a shell from the enemy struck the barrel of the gun and broke it in two. One of the fragments crushed his skull, and completely dashed out his brain, both feet being mutilated at the same time. He died in a moment.

3.—INJURIES OF THE FACE.

(A) INJURIES TO THE SOFT PARTS.

81.—**Excoriation of the face.**—K. Yamaguchi, aged 40, boatswain of the Hashidate in the engagement of the Yellow sea, was standing by the left side of the tower of the 32 c.m. gun on the fore part of the upper deck, in charge of the tackle-menders and stretcher-bearers, when a shell exploded in the tower. One of the flying pieces grated off the varnished paintings on the tower-wall and hit against the lower edge of his lower jaw and inflicted an excoriation. Adhesive plaster was applied ; and the lesion healed the next day.

82.—A. Mikogami, aged 41, senior medical attendant of the Hashidate. In the fight of the Yellow sea, he was directing the carriers of the wounded by the left side of the tower of the 32 c.m. gun in the fore part of the upper deck, when a shell exploded in the tower. One of the pieces blown off the varnished paintings on the tower-wall hit his right malar region and inflicted an excoriation. It was covered with a piece of adhesive plaster and healed the next day.

83.—**Excoriation of the face with burns in the lumbar region**:—T. Ishii, aged 23, a man of the bow-gun of the Hashidate, at the battle of the Yellow sea, was in the tower of the bow-gun and was handing the gas-plate, which was just pulled out, to No. 6 man of the gun, when a shell from the enemy exploded in the tower; one of the flying pieces knocked off the varnished paintings on the tower-wall hit the tip of his nose, inflicting an excoriation, while at the same time, the explosion flame of the shell gave him a slight burn in the loins. Adhesive plaster was applied to the excoriation and olive oil to the burns.

84.—**Abrasion of the face**:—K. Kawara, aged 34, a petty officer of the Fusō, who in the engagement of the Yellow sea, served as a tackle-mender as well as messenger, was at rest cross-legged under the port side of the fore bridge, when a shell came through the lower part of the funnel ; and one of the broken pieces inflicted a linear abrasion on the left cheek. A corrosive sublimate gauze was applied, and it healed on the 10th day by scabbing.

85.—T. Muroi, aged 24, a man belonging to the stern-gun of the Akitsushima, at the time of the attack against the forts of Liukung island on February 7th, 1895, came to the side of the stern-gun on the poop-deck, carrying the cartridges, when a shell burst on the deck, one of whose fragments hit his left cheek inflicting a superficial abrasion 1 c.m. long. A corrosive gauze was applied, and on the 11th of the same month, the lesion healed by drying.

86.—K. Miyake, aged 30, a petty officer of the Tenryu, on January 30th, 1895, was partaking in the bombardment of the enemy's ships in the port of Wei-hai-wei from the occupied fort of Luchotsai, when a shell fired from the ship Teng Yuen struck the barrel of the gun in the fort and exploded, breaking the gun in two. One of the shell fragments inflicted an abrasion about 1 c.m. long on the part immediately above the right superciliary ridge. It was closed with adhesive plaster and healed on the 6th of the next month by scabbing.

87.—**Abrasion of the face and right shoulder**:—Y. Kondo, aged 22, a seaman of the Matsushima, at the engagement in the Yellow sea, was engaged in the conveyance of shells in the fore part of the upper deck, when a 30.5 c.m. shell burst in the fore part of the lower deck, breaking some of the ship's timbers and implements. Some of the iron-fragments that were thrown on to the upper deck inflicted abrasions, one on the left cheek and another on the right scapular region. Iodoform was sprinkled over them and they were then covered with adhesive plaster. The lesions healed by scabbing on the 13th day.

88.—**Abrasion of the left upper eyelid**:—S. Yamaguchi, aged 24, a seaman of the Matsushima, in the fight in the Yellow sea on Sept. 17th, 1894, was standing on the fort of the starboard chasing gun in the fore part of the upper deck, when a 30.5 c.m. shell burst in the fore part of the lower deck breaking the ship's timbers and implements. The iron fragments flew to the upper deck, and one of them inflicted an abrasion on the left upper eye-lid. The wound was sprinkled with iodoform and covered with adhesive plaster. It healed on October 3rd by scabbing.

89.—**Abrasion of the right ear**:—N. Yamamoto, aged 19, a seaman of the Hiyei, in the naval engagement in the Yellow sea, was on the relieving tackle station in the lower deck stern cabin, when a large shell of the enemy's exploded in the next ward-room shattering the walls and deck. One of the flying pieces of wood, inflicted an abrasion 2.5 c.m. long in the right ear. The lesion was sprinkled with iodoform and covered with adhesive plaster. It healed on the 5th day by scabbing.

90.—**Contused wound of the face**:—A. Kōsa, aged 26, one of the torpedo-crew in the fore part of the Matsushima, in the naval battle of the Yellow sea, was at his station in the fore torpedo-room, when a 30.5 c.m. shell burst in the fore part of the lower deck. One of the fragments, that flew into the room, struck him and inflicted a slight contused wound, extending from the lower margin of the nasal septum to the median raphe of the upper lip. The wound was sprinkled with iodoform and closed with adhesive plaster. It healed on the 13th day.

91.—M. Sakaiya, aged 21, a man belonging to No. 2 Hotchkiss gun of the Fuso, in the attack of Zhih island on February 7th, 1895, was standing near the bellows on the upper deck, when a shell perforated the gallant-forecastle and burst. One of the fragments inflicted a small contused wound below the left orbit. When examined, the soft tissues around were so swollen that the eye-lids closed and could not be separated, but happily without causing any injury to the eye-ball. The lesion was therefore washed with a carbolic lotion and sprinkled with iodoform, then compressed with tight-bandages. The swelling subsided gradually and the wound healed on February 20th by scabbing.

92.—K. Yanagimoto, aged 17, a seaman of the Hiyei, in the naval battle of the Yellow sea on September 17th, 1894, was handling the rudder by the wheel on the quarter-deck, when an enormous shell exploded in the ward-room on the rear of the lower deck. He was thrown down by the shock of the explosion, knocking his head against the bridge and thus sustained a contused wound in the front part of the right ear. All the surgeons on board the ship were killed at once by the same disastrous shell, and he had to be only temporarily dressed with a bandage until next morning when the ship arrived at the station of the squadrons near Cape Choppeki. He was treated by one of the surgeons from another vessel. Conditions of the wound : at the lower margin of the right temporal region—that is, just in front of the right ear, there was a wound 1.5 c.m. long and 1.2 c.m. wide, running obliquely backwards and downwards ; the margin of the wound was irregular and the bottom uneven, but no injury was caused to the temporal artery. Carbolic gauze was applied ; and after 4 days the lacerated margin of the wound sloughed. The surface then presented development of granulation. Carbolic gauze was again applied ; the wound progressed favourably, and healed by granulation on October 9th.

93.—Y. Kamiya, aged 21, one of the crew for the No. 9 stern gun of the Hiyei, in the naval engagement of the Yellow sea, was engaged in firing by the right side of the gun ; when a shell from the enemy broke through the aft and upper part of the starboard stern gun port. One of the wooden splinters inflicted a contused wound, at the right corner of his mouth, 1.5 c.m. long and 6 m.m. wide, reaching the submucous tissue. It was sprinkled with iodoform, and the margin of the wound was closed by adhesive plaster. It healed on the 4th day by primary union.

94.—J. Kimiya, aged 25, a stoker of the Tenryu, in the bombardment of the eastern fort of Liu-kung island, on February 11th, 1895, was as one of the fire-brigade, standing in the starboard waist of the lower deck, when a shell struck the No. 2 port gun and burst, badly damaging the upper deck and the skylight of the engine-room. The broken fragments of iron and wood showered on to the lower deck, and one of wooden splinters hit his right cheek, inflicting a contused wound 4.5 c.m. long. The subcutaneous tissues were pierced, and part of the masseter lacerated; the margins were irregular, and the wound open about 1.5 c.m. It was cleansed with a carbolic lotion; the margins pared off and sutured. Corrosive gauze was applied, but on the 15th, as the wound suppurated, the threads were removed, and the dressing was renewed every day. From the 22nd, the discharge of pus decreased day by day; the granulation went on favourably and the wound contracted by degrees. On March 3rd, it healed by the complete formation of a cicatrix.

95.—T. Kashiwabara, aged 21, an oil-man of the Saikyo-maru, in the engagement of the Yellow sea, was standing near the entrance of the engine-room, when two 30.5 c.m. shells from the enemy rebounded at the same time from the sea on the starboard, knocked through the ward-room on the upper deck, and exploded just in front of the port side of the ward-room. One of the wooden splinters, inflicted a contused wound on his face. It was superficial, and 3 c.m. long, running transversely across the right malar region. The margins were clean with a little bleeding. They were sutured and sprinkled with iodoform, and the wound covered with adhesive plaster. The wound healed by first intention on the 6th day.

96.—**Contused wound of the face with contusion of the right knee joint**:—H. Dan, aged 23, a petty officer of the Fuso, at the attack on Zhih island of the 7th February, 1895, was stationed as a signal-man of the ship's speed, and was standing by the starboard side of the fore-mast on the upper deck, when a shell pierced through the gallant-forecastle and burst. Some of the small fragments of the shell inflicted a small contused wound on the right cheek, and a contusion on the outer side of the right knee joint, the latter of which became somewhat swollen and attended with pain. The wound on the face was closed with adhesive plaster, and that on the knee tightly bandaged. Both lesions healed on the 15th of the same month.

97.—**Contused wound of the face with abrasion of the left forearm and the right thigh**:—G. Yamashita, aged 27, one of the crew of the fore revolving gun of the Katsuragi, in the bombardment of the eastern fort of Liukung island on February 11th, 1895, had scarcely turned the gun so that he could fix it, when a hostile shell struck the barrel and burst into pieces. One of the shell fragments gave him a contused wound 1.5 c.m. long on the chin ; it reached beneath the skin causing slight bleeding, but no injury to the bone. At the same moment, an abrasion of the outer side of the right thigh was inflicted by a wooden splinter ; and the front of his left wrist was bruised so as to interfere with the movements of that joint. The wounds on the chin and thigh, were covered with sublimate gauze ; and the wrist was fixed up. Next day, the patient was removed to the hospital ship Kobe-maru and whilst being treated in that vessel, both wounds nearly healed by cicatrices, the swelling and pain of the left wrist also subsided greatly. He was then removed to the Sasebo Naval Hospital. On admission, the wound on the lower jaw was covered with a bloody scab ; the abrasion of the thigh was completely healed, and the swelling on the wrist had nearly subsided, leaving only a patch of ecchymosis which was undergoing absorption. On the 26th of the same month, he left the hospital to resume service.

98.—**Contused wound of the face, neck and extremities:**—T. Yamanouchi, aged 30, a cook on board the Tsukushi, in the attack on Zhih island on February 3rd, 1895,was working in the kitchen on the lower deck, when an enemy's shell broke through the upper deck, passed down to the lower, and there pierced the kitchen. Some of iron and wooden pieces thus broken off struck him, inflicting several contused wounds: one 3 c.m. long and 1 c.m. wide on the upper lip close to the right nasal wing ; one 10 c.m. in length and 1 c.m. in width, extending from the lower part of the right ear to the neck ; also small wounds were found on the right eye-brow, over the right cheek, on the left index finger, on the outer side of the right thigh, on the back of the right elbow ; besides, there were numerous fine pieces of splinters sticking in the exposed parts such as the face, neck and hands. The wounds were cleansed with a carbolic lotion and sublimate gauze was applied ; they progressed favourably without suppuration, and healed on the 15th of the same month.

99.—**Contused wound of the face and limbs with contusion of the left thigh :**—K. Tabata, aged 25, one of the crew of the starboard 9 pounders of the Tsukushi, in the attack on Zhih island on February 3rd, 1895, was standing by his gun on the middle part of the upper deck, when a shell came from the port side and pierced through the lower part of the funnel. Some of the iron pieces thus broken off inflicted several contused wounds, as following :—one 3 c.m. long on the back of the left wrist, one on the back of the left hand, one 5 m.m. long on the back of the right hand, one 1 c.m. square on the left eye-brow, and one on the upper lip; one 1 c.m. long and as deep as the periosteum, at a spot 5 c.m. below the left patella; one over the dorsum of the left foot, one on the dorsum of the right great toe. Besides, there was a contusion 1 c.m. square above and inside the left knee, which gave pain in walking. Those wounds were washed with a carbolic lotion and foreign substances were extracted. Sublimate gauze was then applied, and the inflamed parts kept cool. On the 5th of the same month, he was removed to the transport Yedo-maru and admitted to Sasebo Naval Hospital on the 10th. On admission the bandages were for the first time changed, when the wound on the left wrist was developing granulation, the other smaller ones had completely formed scabs. The same treatments were continued, and the case progressed favourably. On March 14th, he left the hospital to resume his service.

100.—**Contused wound of the left ear :**—Y. Kamada, aged 32, one of the crew of the stern-gun of the Akagi, in the battle of the Yellow sea, was engaged in firing upon the enemy, and was standing on the fort of the stern-gun in the rear of the upper deck, when a shell exploded piercing the shield of the gun. He sustained, from one of the fragments of the shell, a lacerated wound 1.5 c.m. long, above and in front of the auricle. A flap hung from the lacerated part and the wound bled profusely. The hœmorrhage was stopped by twisting the vessels; and the flap united by adhesive plaster and corrosive gauze applied. When the bandage was removed on the 7th day, the flap had healed by the first union. He had on the 4th day completely recovered.

101.—**Contused wound of the left ear and back of hand :**—R. Kimura, aged 23, a servant to the Captain of the Saikyo-maru, in the battle of the Yellow sea, went on to the bridge carrying a message for the Captain. He finished his business, and on his way back was just passing the entrance of the ward-room, when suddenly two 30.5 c.m. shells from the enemy rebounded from the sea on the starboard side, knocking through the ward-room on the upper deck and exploding on the port side of the ward-room. The fragments of the shell and wood were driven about, and some of them struck him on his left ear and hand. On examination, there were two contused wounds: one, ⊣ shaped, 3 c.m. in length at the middle of the back of the left pinna; and the other 6 m.m. on the back of the left hand. Both lesions were superficial, so that the bleeding was slight. Iodoform gauze was applied; and after a week the lacerated margins on the hand sloughed while that of the ear was slightly inflamed causing suppuration. The wounds were treated with carbolic lotion and sublimate gauze. The sloughs having come off on the 14th day a granulation set in favourably and the lesion lessened remarkably. On October 10th, both wounds were completely healed by cicatrization.

(B) WOUNDS OF THE FACE WITH FRACTURE.

102.—**Compound fracture of nasal bone with abrasion of the right side of the chest:**—Y. Nagamine, aged 33, a petty officer of the Matsushima in charge of the after magazine. In the battle of the Yellow sea, he was passing the waist of the lower deck, to inspect the supply of shells, when a 30.5 c.m. shell exploded in the fore part of the lower deck, and one of its fragments inflicted a contused wound on the dorsum of his nose, with fracture of the right side of the nasal bone. Another fragment made a small abrasion over the region of the 10th rib, in front of the right side of the chest. Iodoform was sprinkled on the wounds and sublimate gauze applied, and fixed with adhesive plaster. On September 20th, the abrasion of the chest had healed up, while there was a little discharge from the wound of the nose, attended with a slight swelling around its margin. The wound was washed with carbolic lotion and covered with iodoform gauze,which was changed every other day. On the 30th, the discharge had nearly ceased and the surface of the wound was greatly reduced by the development of granulation. Treatment continued as before, the bandage being renewed twice a week. On October 15th, the wound on the dorsum of the nose was nearly healed leaving only a surface of granulation, the size of a bean to which boracic ointment was applied. On the 26th a cicatrix formed so fairly, that the wound healed without leaving any striking deformity.

103.—**Compound fracture of superior maxillary bone (accompanied by retinal hœmorrhage) with penetrating wound of left arm and contused wound of left forearm:**—T. Hanamitsu, aged 24, a man of No. 4 q.f. gun of the Akagi. In the battle of the Yellow sea, he was temporarily ordered to turn the pump and was hurrying to the fore part of the upper deck, when fragments of a hostile hell flew up from the under part of the shield of No. 3 gun, and inflicted several wounds on his face and left upper extremity. On examination the wounds were found to be as follows:—first, a wound 1 c.m. in diameter just below the left eye, passing into the antrum of Highmore. Bleeding was profuse, but the posterior wall of the antrum was intact and his mind clear without any cerebral symptoms. Secondly, a perforating wound on the outer side of the upper part of the left arm. The entrance orifice was found in the front of the arm measuring 5 c.m. in diameter, with loss of the soft tissues and laceration of the margins. The deltoid muscle was pierced making an exit on the outer and posterior side of the arm. The exit was ragged and the crushed muscular fibres were seen protruding. Its size was rather smaller than that of the inlet. There was bleeding from the wound but the shoulder joint escaped lesion. Thirdly, two lacerated wounds, each 2 c.m. long, were found : one just beneath the elbow joint on the outer side of the left fore arm, and one on the inner side the of same joint. The wound of the face was cut open a little, and on examining the inside some fragments of the broken bone and blood clots were extracted, but there were no foreign bodies to be found. After the application of an antiseptic dressing to the wound, the patient was kept in absolute rest. On the 18th, bleeding occurred from the wound, the lids of the left eye were swollen and discoloured the temperature rose to 39° C. ; the dressing was renewed. On examining the eye two or three small, black iron fragments were found sticking in the conjunctiva, these were extracted, and the eye was cleansed with boracic lotion and the compress applied. On the morning of the 19th, the temperature fell to 37.°5 C.; he was taken on board a transport bound for home and was admitted to the Sasebo Naval Hospital on the 21st. On admission, the left half of the face was swollen,—especially the left eye lids—accompanied by pain : the conjunctiva was also inflamed. On examination, the conjunctiva was found still to retain a black speck which was soon cleansed away and the application of boracic compress continued. The other wounds were doing well, the temperature not exceeding normal. On the 26th, the surfaces of the wounds began to show the development of granulation ; on the 30th, he was removed to the Kure Naval Hospital. At the time, the swelling of the left eye-lid, and conjunctivitis, was gradually subsiding. The vesion when examined was found to be $\frac{20}{100}$. As for the wound of the face, the granulation developed so as to fill up the antrum of Highmore but a discharge of pus, mixed with blood, came out of the nose and mouth, so the nasal passage was washed with carbolic lotion. At this time, anæsthesia of the lips and left cheek was complained of. On October 10th, the wounds of the fore-arm were almost healed, and that of the arm likewise presented favourable granulation. Pain was complained of at the outer side of the left elbow, and on close investigation a fracture of the outer condyle of the humerus was discovered. This was fixed by a bandage. On the 23rd, the inflammation of the left eye was entirely subdued yet there was no sign of recovery of the eye sight. On examining the fundus a hœmorrhage of the retina was recognized. After the 23rd, internal administration of iodide of potassium and injection of pilocarpine were tried. On November 13th, the canal of the perforated wound of the left arm was closed at its middle part, the openings at both ends being also filled with granulation; the surface of the facial lesion grew even, and the discharge from the nose and mouth entirely ceased. On December 18th, the facial wound healed, a cicatrix the size of a 10 *sen* coin being formed. On January 2nd, 1895 the wound of the arm, as well as the fracture of its external condyloid eminence, had healed; the left arm however was emaciated, with much loss of grasping power, and on movement of the elbow joint, pain was felt along the ulnar nerve. The anæsthesia of the left cheek and lips still continued as before. The sight of the left eye was less than $\frac{20}{100}$ and he could hardly count fingers at a distance of 4 feet. Thus being unfit for active service; he was permanently invalided on February 9th and granted a pension according to regulation.

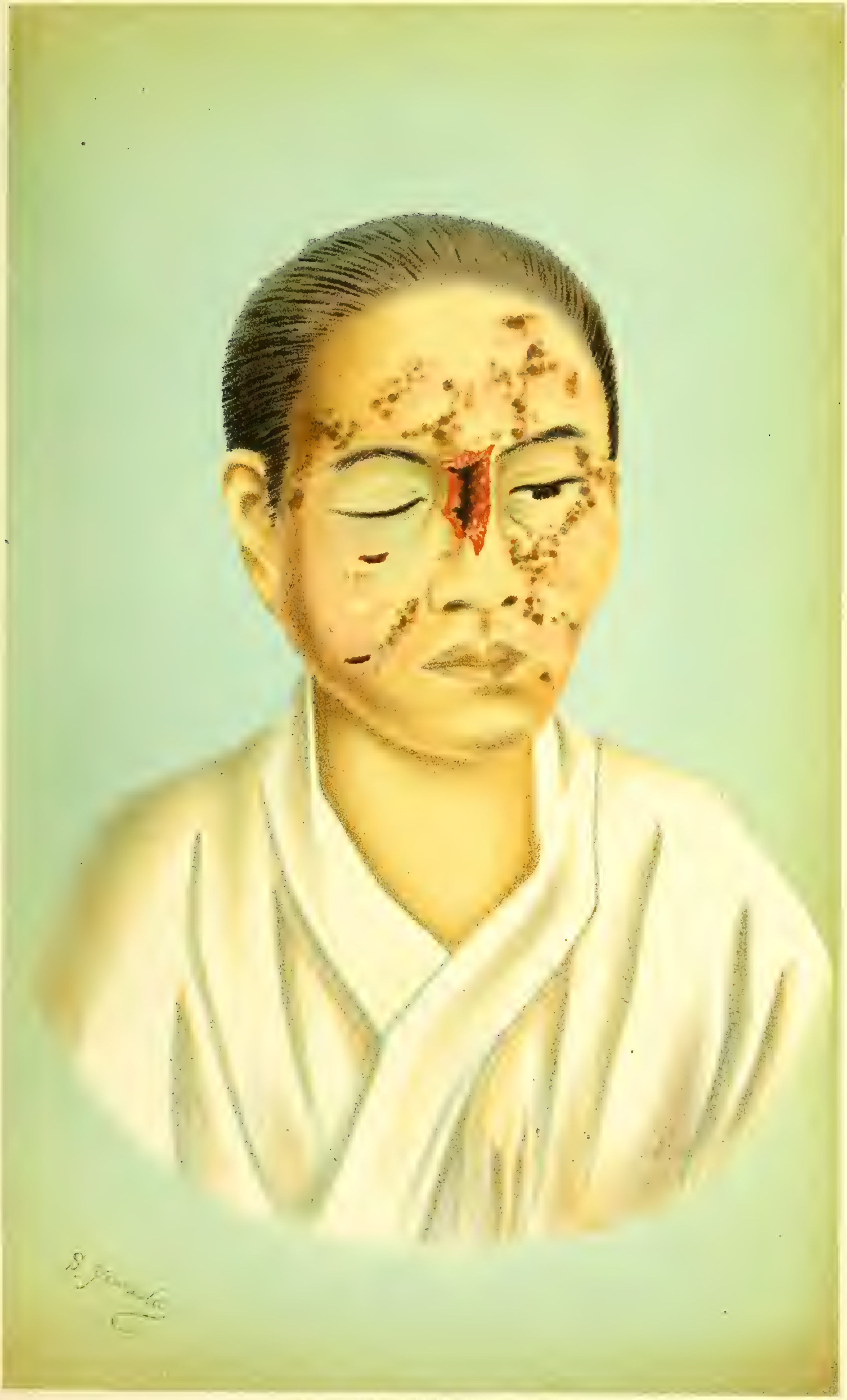
104.—**Compound fracture of the lower jaw**:—S. Koyama, aged 26, one of the crew of the 17 c.m. gun on the port side of the Fusō. In the battle of the Yellow sea, he was at rest, sitting cross legged, on the port side of the funnel casing, when a shell burst through the lower part of the funnel, scattering the fragments, and one of them inflicted a compound fracture of the right side of the lower jaw. The wound was dressed temporarily and he was admitted to Sasebo Naval Hospital on September 21st. On admission, the condition of the wound was as follows:—it was a lacerated wound 4 c.m. long and 2 c.m. wide, extending from the right angle along the inferior border of the lower jaw. The margins of the wound were remarkably severed, presenting a ragged appearance and being wide open. The horizontal portion of the maxilla was crushed to pieces, and was retained in *Sitû* by means of the periosteum and muscle. The broken pieces were removed and the wound was closed with iodoform gauze. On the 27th, two more pieces became loose and were extracted, one being the size of the tip of the thumb and the other that of the index finger. The movements of the jaw were not interfered with, and the wound progressed favourably and healed by the formation of a cicatrix on October 27th.

105.—**Bullet wound of the lower jaw**:—S. Kawada, aged 27, a seaman of the Naniwa. On March 24th, 1895, while reconnoitring a native house in the Pescadores, on duty with a landing party, he was, suddenly shot by a rifle at a distance of a few yards where an enemy lay in ambush, and sustained a wound extending from the lower jaw to the neck on the right side. He was immediately attended by a surgeon belonging to the landing party, and soon returned to the ship. On examination, the wound was found to extend from the chin along the lower border of the horizontal ramus of the lower jaw, to the lower and outer part of the neck. It measured 12 c.m. in length and a gap of about 8 c.m. in its widest part. It penetrated into the cavity of the mouth, and in its passage severed the mylo-hyoid, genio-hyoid and submaxilliary gland completely, and the genio-hyo-glossus partly. The right side of the body of the lower jaw was broken into several pieces, a part of it being pulverized. By the laceration of the muscles the tongue was drawn back causing difficulty in speaking and swallowing. The carotid artery, though its sheath was exposed, happily escaped injury. The lingual artery was likewise uninjured. The facial artery was severed but bleeding soon stopped ; there was only capillary hœmorrhage accompanied by a little pain. The bullet seems to have entered through the chin and found its exit in the right side of the neck, crushing the jaw and the skin over it in its course. There was another small lacerated aperture about 2 c.m. in length somewhat behind the right side of the neck, through which bony fragments seem to have passed out. The loose fragments of bone were extracted, the surgeons at the same time endeavouring to preserve the periosteum and gums as much as possible. The lacerated mucous membrane of the mouth, was pared and the margins sutured. A gargle of boracic acid was ordered. The lacerated portions of the skin were sutured too, as far as union could be expected, and a carbolic gauze was applied ; a fluid diet being ordered. On the 26th of the same month, except the union of a small portion of the skin the greater part had become gangrenous. The sutures were therefore removed, iodoform was dusted on and a wet carbolic dressing applied ; the temperature kept at about 38° C., but rose to 39° C. on the evening of the 28th. A moderate dose of quinine was administered night and morning, and the dressing was renewed twice a day. On the 29th, the sutures of the mucous membrane of the mouth came off, leaving a gap to which absorbent cotton wool was applied. The discharge of pus from the wound was copious, and its lacerated portion having sloughed, an offensive odour was emitted. On the 31st, the sloughs gradually came off, and granulation developed at the bottom of the wound. Since the preceding night, the temperature had not exceeded 37.°8 C. This day the patient was removed to the hospital ship Kobe-maru. Examined on board the vessel : the greater part of the right half of the body of the lower jaw, from its angle to the symphysis, was damaged ; the bicuspids, the first molar and a part of the second molar were lost, whilst the incisor teeth were loosened. The soft parts around the chin and the upper part of the neck were torn open, the pulsation of the carotid artery could be seen at the bottom of the wound which communicated with the cavity of the mouth, through a laceration about 1.5 c.m. wide ; granulation was unfavourable and the pus discharge copious. On April 1st, the temperature rose to 39.°8 C. and the mucous membrane under the tongue became swollen, pain being complained of at the part. The dressing was changed twice daily as before, and a gargle of chlorate of potash was administered. On the next day the temperature fell to the normal point, and the slough of the wound having completely come off, granulation became even and the pus discharge almost ceased. On the 4th, he was transferred on board the Bankoku-maru homeward-bound, and was admitted to Sasebo Naval Hospital on the 8th. From that time, the temperature kept normal the swelling of the mucous membrane of the mouth subsided, the pus discharge became very slight and granulation developed gradually. On the 20th, a small fragment of bone which appeared on the surface of the wound was extracted. In May, the greater part of the wound had formed a cicatrix, but the laceration communicating with the mouth had not yet closed. The lacerated part was touched with silver nitrate. On the 16th, the patient was removed to Yokosuka Naval Hospital. At the time, the greater part of the wound had formed a curved cicatrix, 12 c.m. long, running along the inferior margin of the right side of the lower jaw, in the middle of which a granulating surface of 2 c.m. long was left, communicating with the cavity of mouth by a small sinus. As the right half of the lower jaw had been damaged the chin inclined to the right, so that the juxtaposition of the upper and lower teeth was lost when the mouth was shut ; consequently articulation, mastication and deglutition were greatly hindered. The treatment was the same as before and the fluid diet continued. On the 28th, the loose canine and incisor teeth were pulled out. On June 3rd, two pieces of dead bone were picked out of the wound in the mouth. On July 26th, the sinus communicating with the mouth at last closed, and the surface of the wound contracted greatly. On August 27th, the wound healed completely by the formation of a cicatrix but the twisting of the lower jaw became still greater. By the continuous use of tonics and nutritious diet the strength of his body was gradually restored. However, from the loss of a part of the lower jaw articulation and mastication were seriously impeded, so he was invalided for life on January 15th, 1896, and granted a pension according to regulations.

106.—**Compound fracture of the face (rupture of the right retina) with a blind wound of the right leg**:—S. Ikebe, aged 30, a seaman of the Akitsushima. In the battle of Yellow sea on September 17th, 1894, he was acting as tackle-mender, also assisting in carrying shells to No. 5 side gun, when an enemy's shell exploded by striking against the shield of that gun. Some of the flying fragments inflicted a compound fracture on the dorsum of the nose and a blind wound on the inner side of the lower part of the right leg.

On examination, a vertical lacerated wound was found extending from the summit to the middle of the dorsum of the nose. The nasal spines of the frontal bone, the nasal bones, the nasal processes of the superior maxilla and a part of the perpendicular plate of the ethmoid were crushed, and the wound presented a cave-like appearance, retaining in it pieces of bone and fragments of the shell. There was an ecchymosis into the right orbit of the eye; and a marked swelling of the right lid, so that the eye could not be opened. There were also penetrating wounds, one at the lower part of the inferior margin of the right orbit, and the other at the upper and outer part of the right corner of the mouth. In the latter wound a fragment of shell about the size of the tip of the thumb was discovered. Another small wound was found on the inner side of the lower part of the right leg. Also burns, due to the explosion of the powder, were present on several parts of the face. The fragments of shell and bone were extracted from the wound in the nasal region and a fragment of shell from the wound near the corner of the mouth. All the wounds were dressed antiseptically. During the night bleeding occurred from the wound at the nasal region so as to wet through the bandage which was therefore changed, and a cold compress was applied over it. Next morning, the hœmorrhage had stopped entirely, but the swelling of the face was severe, especially over the eye-lids. On the 19th he was sent to Sasebo Naval Hospital on a transport and admitted on the 21st. At the time, the face, especially the right half, was remarkably swollen; the right eye-lids were so swollen that the examination of the eye-ball could not be made. The left eye-lids were slightly swollen too, with congestion of the conjunctiva, but the sight was not obscured. In the wound below the right orbit a hard lump was found which was cut open, and proved to be, a small fragment of shell and was extracted. On the 28th, the swelling of the face had subsided. On the 5th of October, the wound of the nose had developed granulation so as to cover the fractured parts. Along the septum and left side of the nose, there was a tenderness, accompanied by anæsthesia in the right half of the forehead and cheek. The right lower wisdom tooth was extracted as it was loose and gave pain, owing to its partial destruction by a fragment of shell that had entered through the right cheek. Of the eye, the right pupil was dilated and the sight remarkably impaired so that he could only distinguish light from dark. By an ophthalmoscopic examination, rupture of the retina was discovered. On the 14th the wound above the inner ankle of the right leg, was narrowing in its inlet yet pus accumulated inside, so it was cut open to evacuate the pus. By probing through the open wound a small fragment of shell was found on the inner side of tendo Achillis, which was extracted, a counter opening was made behind the outer ankle, and a drainage tube introduced. On the 21st, the wound on the right cheek had healed ; and on the 25th of November, the wound on the leg had greatly narrowed by the development of granulation, so the drainage tube was removed ; the lesion of the nose also became gradually narrowed. On December 23rd, the wound of the right leg was healed. The right eye gradually recovered its sight so that the patient could now perceive objects clearly, but the pupil remained as much dilated as ever, and external strabismus resulted, so that the patient complained of diplopia. On the 24th of February, 1895, a plastic operation was performed. The procedure was as follows :—Under chloroform the skin over the superior maxilla was fully separated round the nasal wound and brought together at the median line by stitches ; drainage tubes were inserted into the nostrils and dressed antiseptically. On March 2nd the operated parts healed by first intension, leaving only a granulating surface about the size of a bean at the root of the nose to which boracic acid and vaseline was applied. On the 16th of the same month, every wound had healed completely. However, the sight of the right eye remained very weak, the patient being hardly able to read No. 200 of Snellen's type at a distance of 4 feet. On ophthalmoscopic examination a grayish-white scar was found on the upper and outer part of the optic disc which presented folds radiating from the scar by the puckering of the retina. Besides, several other sad sequelae were left such as divergent strabismus, flattening of the nose, closure of the right nasal meatus and dulness of the sense of smell and paralysis of the right cheek. On the 24th of April, he was invalided from the service for life, and granted a pension according to the regulation.

(*See the illustration*)



S[illegible] ABLE SEAMAN, MATSUSHIMA [illegible]

PENETRATING WOUND OF THE FACE WITH FRACTURE OF THE NASAL BONES.

(C) INJURIES OF THE EYE.

107.—**Contusion of both eyes with contused wound of the left knee and abrasion of the chest and lower limbs** :—S. Kaga, aged 24, a man to No. 1 Q. F.-gun of the Akagi. In the battle of the Yellow sea on September 17th, 1894, he was firing the No. 1 Q. F.-gun on the starboard side of the bridge, when a 15 c.m. ? shell came from the stern and passed away about a foot in front of his eyes, and burst against the support of the gun. Some fragments of the shell hitting him, he received abrasions over the outer part of the left clavicle, and on the lower limbs, and a lacerated wound on the left knee; at the same time, both eyes lost their sight. On examination there was found congestion of the conjunctivæ of both eyes attended with pain. This was especially the case with the right eye, but no injury to the lids and balls could be discovered. The wound of the left knee was a lacerated one in a crescent form 5 c.m. long running straight downward from just above the patella; it reached to the periosteum yet without causing attrition of the membrane or injury of the bone. Other wounds were found in the following parts—two small abrasions just below the last wound in front of the left leg; an oval shaped abrasion 6 c.m. in diameter on the outer side of the right thigh; four small abrasions in front of the middle part of the right leg. To the eyes, a compress of boracic lotion was applied and antiseptic dressings to the other wounds. On the 19th he was removed on board a transport and admitted to Sasebo Naval Hospital on the 21st. At the time, the margins of the wound at the knee were slightly inflamed, attended by a little discharge. In the case of the other wounds, as there was no suppuration, they dried up but the conjunctivæ in both eyes were inflamed, the cornea of the right eye became turbid, and the lenses of both eyes cloudy, and vision was completely lost so that the light could not be distinguished from the dark. As the pains in both eyes were intense, atropine was dropped and a cold compress of boracic lotion was applied. On the 26th, the irritative symptoms of the eyes abated so that they could now be minutely examined: the right eye was congested all over, the cornea slightly dimmed with ciliary congestion, the iris presented a serrated appearance owing to the posterior synechia at the upper part of the free margin. The lens was partly dislocated towards the nasal side and had became somewhat turbid, presenting a slightly grayish colour. The sight was found scarcely enough to perceive the movement of fingers in front of the eye. With the left eye, the dilation of the pupil was the only abnormality that could be recognized with the naked-eye; but with the ophthalmoscope detachment of the retina was discovered, and the disc presented an irregular square shape, and in its neighbourhood retinal hæmorrhage had taken place. On the nasal side of the disc both detachment and hæmorrhage were more marked. The sight was so far destroyed that light could not be distinguished from darkness. As to the treatment of the eyes, leeches were applied on the temples in addition to the measures already mentioned. In October the congestion of the eyes greatly abated but without signs of the sight being restored. By the 13th of October, all the abrased wounds had nearly healed by scabbing, with the exception of the lacerated wound of the knee which was however now growing a favourable granulation. In order to promote the absorption of the effusions in the eyes, hypodermic injection of pilocarpine and internal use of iodide of potassium were tried. On the 28th, the injured man was removed to the Kure Naval Hospital, where the lesion of the knee progressed favourably, and at last healed by cicatrization on February 10th, 1895. The symptoms of irritation in the eyes had entirely disappeared so that congestion and pains would probably not come again, yet both eyes were blinded without any hope of recovery. The injured man was therefore invalided for life on the 11th April, and granted a pension according to the regulations.

108.—**Contusion of the right eye with lacerated wound of the right arm**:—T. Sato, aged 27, Chief Navigating Officer of the Akagi. In the battle of the Yellow sea, he stood on the middle of the bridge commanding the movements of the vessel in lieu of the Captain who had just been killed, when a shell came by the stern and struck the after netting on the starboard side of the bridge. By some of the iron and wooden fragments thus broken off, he sustained injuries to the right eye and arm. Conditions of the wounds:—there was a small and superficial abrasion on the right upper lid attended by the congestion of the ocular conjunctiva and pain, which prevented the lid from opening. However, no marked injury was recognized in the eyeball. On the outer side of the middle part of the right upper arm, there was a flap-shaped lacerated wound of 3 c.m. in length and 1 c.m. in depth, at its bottom there could be seen a piece of black cloth; and the wound bled freely. Besides, an oval-shaped abrasion, 5 c.m. in diameter was found below the last named wound. The foreign body in the wound was extracted, antiseptic dressing was applied; and to the right eye, a compress of boracic lotion. Then the injured officer went back straight to his post. The next day the eye bandagewas removed and the right eye examined. There was blood effusion in the anterior chamber so that the lower half of the cornea presented a crescent of a dark reddish colour and the sight was greatly obscured. Three days after, the effusion had much abated, and on the 23rd it was almost entirely absorbed to the consequent revival of sight. Though the abrasion of the upper arm, was healed; the margin of the lacerated lesion in the middle part of the arm, presented a sloughy condition with discharge of pus, and the granulation of the wound was of a dull nature. Iodoform was sprinkled on, and a carbolic gauze applied. On October 1st, the abrasion of the eye-lid healed by scabbing, and the effusion of blood in the anterior chamber was completely absorbed, but the patient complained of epiphora and mucœ volitantes when he looksed steadily at anything. On the 3rd, the slough of the wound on the upper arm had quite come off, and granulation developed, so as to make the surface even; and the pus discharge had decreased. The vision being now $\frac{20}{30}$, there still existed mucœ volitantes. The eye bandage was therefore replaced by an eye-shade. On the 27th, the wound of the upper arm healed by cicatrization and the injured eye exhibited a slight external strabismus, but as the sight was almost entirely restored, treatment was discontinued.

109.—**Contusion of the left eye and contused wound of face:**—T. Takano, aged 26, a junior engineer of the Tenryū was at the time of the bombardment of the eastern forts, Liukung island on February 11th, 1895, on duty in the engine room, when a hostile shell exploded against the gear of the No. 2 port side-gun on the waist of the upper deck and thus broke the deck plank. Some of the wooden splinters fell down into the engine room, and inflicted a contused wound 4.5 c.m. long and 1 c.m. wide reaching to the periosteum over the part below the left frontal eminence extending through the middle of the eye-brow to the left upper lid. The margins of the wound were raggedly torn and there was a slight hœmorrhage, the upper and lower lids being remarkably swollen. On examination of the eye, an effusion of blood under the conjunctiva and into the anterior chamber was noticeable, the cornea was cloudy, so that the sight was entirely lost. The right eye presented no striking change but a slight congestion. Next, there was an abrasion 3 c.m. square below the left malar arch, in which many tiny wooden splinters like pins were found sticking. These being extracted, the wounds were washed with carbolic lotion, and then corrosive gauze was applied. On the same day, the injured officer was taken on board the hospital ship Kobe-maru. On the 13th: the swelling of the eye-lids had somewhat subsided, but the conjunctiva produced a marked swelling and the cornea remained cloudy. On the 14th: the wound on the cheek healed under the scab, and that of the forehead developed granulation so that it was partly covered by epithelium, but the condition of the left eye remained as before. On the 20th, the injured officer was sent to the Sasebo Naval Hospital. At the time, the wound of the forehead had partly healed. The upper lid of the left eye was strikingly swollen and hung down over the lower which was itself tumefied. On examination the conjunctivæ were inflamed, especially that of the eye ball was greatly swollen over-lapping the margin of the cornea, making it seem as if the cornea had sunk into the interior of the ball. The cornea was grayish and opaque and pain was felt in the eye. The right eye had conjunctival congestion, with photophobia. The wound of the eye-brow was covered with carbolic gauze; and the eye was washed with boracic lotion; the swollen conjunctivæ were scarified and cold boracic compress was applied. On the following 24th, the conjunctivitis of the lids was intensified, there was great pain and swelling, so the part was scarified again; and a dose of a mild purgative was administered. Thus the pain of the eye was slightly mitigated, yet the swelling remained as before. On March 2nd: the swelling of the left eye subsided gradually. The wound of the eye-brow had a very slight discharge with favourable granulation and was greatly contracted. The congestion of the right eye had not quite disappeared. On the 13th, it was found that the tumefaction and pain of the left eye had greatly abated. The sight was so entirely lost that light and dark could not be distinguished. The cornea was quite opaque so that the fundus could not be examined. On the 21st, the wound of the eye-brow cicatrized successfully. The conditions of the left eye continued the same. The right eye had a slight congestion with photophobia and lacrimation. In addition to the previous prescription, a weak solution of sulphate of zinc was dropped in the right eye and iodide of potassium administered internally. Fom that time the inflammation of the eye-lids and conjunctivæ subsided by degrees, but the left eye-ball gradually withered and pain came on now and then with aggravation of congestion. The congestion of the right eye obstinately resisted all remedies. Thus the left eye had entirely lost its function, and it served only to cause irritation of the healthy eye, so the enucleation of the eye was performed on the 24th of April under an anœsthetic. The enucleated eye-ball was atrophied to the size of the tip of the index-finger. The conjunctiva and muscles of the eye were indurated; on section the eye was found to be as hard as a cartilage; the choroid and vitreous body were present, but the lens had disappeared, and the optic disc had contracted to the size of a linseed. After the operation the progress was favourable. On the

3rd of May, the interior of the orbit was clean, presenting no suppuration. On the 13th, the margin of the wound healed by the first intention. Hence, the congestion and photophobia of the right eye greatly abated, but headache occurred intermittently. On the 27th, it ceased entirely as well as the congestion of the right eye ; an artificial eye graciously bestowed by H. I. M. the Empress was applied and on June 6th, he left the hospital and returned to his duty, but was afterward by his wish, invalided for life with the grant of the regular pension.

110.—**Penetrating wound of the right eye with burns of face, left hand and loin**:—S. Ogawa, aged 26, one of the crew to 32 c.m. gun of the Matsushima. In the battle of the Yellow sea on September 17th, 1894, he was firing in the tower of the said gun, when a shell struck against the wall of the tower and burst. One of the iron fragments thus broken, penetrated the inner canthus of the right eye causing extravasation of blood in the anterior chamber. He also sustained burns of the second degree from explosion-gas on both ears, on the left forearm and hand and on the left lumbar-region. Directly after the accident, a boracic wet compress was applied to the eye, and an oil lint to the burns, strict rest being ordered. The injured man was sent to the Sasebo Naval Hospital on the 20th. Examination at the hospital: a small lacerated wound near the inner canthus of the right lower lid was found which perforated through the all the layers of the lid, and entered into the inner and lower part of the eye-ball. The conjunctival congestion and the effusion of blood in the anterior chamber prevented the examination of the fundus. On the 28th, the laceration of the right eye-lid had healed, and the surfaces of the burns developed a new epithelium though there remained several suppurating points. On October 14th : the burns of the ears and the left fore-arm had healed completely while that on the loin left an ulcerated surface about the size of a two *sen* copper piece. The congestion of the conjunctiva had diminished and the extravasation of blood into the anterior chamber was being gradually absorbed. On the 19th, the burn of the loin had healed, and blood effusion in the anterior chamber was being, by degrees, absorbed ; the fundus could hardly be examined owing to the turbidity of the aqueous humour, but the presence of a deep blue spot on the temporal side of the interior of the eye was recognized. November 6th : the aqueous humour became almost transparent so that light and dark could be faintly distinguished. The eye-ball had gradually shriveled and the upper lid dropped down. December 20th : the aqueous humour was cleared up by the absorption of its turbidity ; the iris had the posterior synechia, the pupillary margin presented a serrated appearance, the fundus could be seen without the aid of an ophthalmoscope, thus evidencing that the lens was absent; at the outer and lower part of the fundus, an old striated patch of blood extravasation was found which proved to be what had been before recognized as a deep green spot. The eyes however remained almost blind; indeed, the eye had undergone no remarkable change since the first, but there appeared occasional symptoms of inflammation. Thus no hope of recovery of the sight could be expected, while if the eye was left in that state, there was reason to fear the occurrence of sympathetic ophthalmia. Therefore the injured eye was extracted on March 9th, 1895. When examined after the enucleation an iron fragment about the size of a bean was found concealed in the sclerotic at the outer and lower part of the ball (see the illustration No. 2); the lens was dislocated downward; the retina detached with an effusion of blood on its outer and lower side; the eye-ball had collapsed. After the operation, the course was favourable. On the 28th May, the injured man had the honour of having an artificial eye graciously presented to him by H. I. M. the Empress. On the 14th June he was put on the list of the invalided for life, and left the hospital. He was then granted a pension in accordance with the regulation.

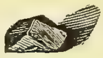


Fig. 2. Iron fragment which had penetrated into the right eye-ball.

111.—Penetrating wound of the left eye, blind wound of left leg, and lacerated wounds of left fingers:—Y. Tanaka, aged 25, one of the crew of the No. 5. side-gun of the Akitsushima. In the battle of the Yellow sea on September 17th, 1894, he was engaged in carrying cartridges in the neighbourhood of the starboard No. 5 side-gun on the waist deck, when a hostile shell exploded against the shield of the gun. By the explosion, he sustained a slight burn on the face, some gun-powder sticking into the skin, and at the same time small iron fragments and gun-powder penetrated into both eyes, and he had a lacerated wound on the nasal side of the left eye, which reached deep down into the interior. An effusion of blood ensued in the anterior chamber causing entire loss of sight of the eye. The vision of the right eye remained unaffected. On the inner side at the upper third of the left leg, there was a lacerated aperture as large as the tip of the index-finger. The aperture ran beneath the gastrocnemius outward and down-ward measuring 7 c.m. in its length. There was also a lacerated wound on the ulnar side of the left index-finger, and the second phalanx of the left little finger was crushed. The eyes were washed with a boracic lotion ; foreign bodies were extracted from them and wet compresses of boracic acid were applied ; the other wounds were dressed with carbolic gauze. On the 19th, the injured man was sent on board a transport, to the Sasebo Naval Hospital. At the time of admission, the conjunctiva of the left eye was swollen ; the anterior chamber presented a dark reddish colour owing to the effusion of blood ; the pupillary region was clouded and of a yellowish colour ; the opening of the conjunctival wound had already healed. The conjunctiva of the right eye was congested ; the cornea and lens were sound ; the sight was not impaired, but the pupil was somewhat dilated, and the reaction to light was very slow. The wounds on the left fingers and the left leg were of a gray colour on the surface, with a slight discharge of pus. On the 26th the presence of a foreign body in the wound of the leg was found by probing ; a counter opening was made on the outer side, and a fragment of shell about the size of the tip of the thumb was extracted. The crushed portion of the little finger was covered by granulation. On the 11th of October, the congestion of both eyes greatly abated, and the vision of the right eye improved, yet muscæ volitantes was complained of. The effusion of blood in the anterior chamber of the left eye underwent absorption, yet the opacity of the cornea existed as before to the complete loss of sight. A mild purgative was given and leeches applied to the temple. On the 25th the left eye underwent slight atrophy and presented no signs of the recovery of sight. The vitreous body of the right eye was found to be clouded, and the lens of the left eye was found to be quite opaque and of a yellowish gray colour (traumatic cataract). The use of a moderate quantity of iodide of potassium was continued. On the 27th, the surface of the crushed wound of the little finger became cicatrized ; the canal wound on the leg was filled with granulation and the surface contracted. On the 28th of December, the wound on the outer side of the leg healed. The left eye increased its degree of atrophy. The sight of the right eye gradually recovered its power, and the muscæ volitantes was greatly relieved. On the 6th of January, 1895, the wound on the inner side of the left leg healed. But owing to the contraction of the cicatrix the knee joint assumed an angle of 150° so as to hinder proper movements. Spirit of camphor was applied and active and passive movements of the joint were encouraged. Ever since the left leg has gradually increased the degree of flexion and extension, yet in walking, a stick was found necessary. Signs of the eyes :—the sight of the right eye fell a little short of $\frac{20}{200}$; the muscæ volitantes still remained. The atrophy of the left eye increased noticeably and, was attended by occasional irritative symptoms. It was thought that there might exist some foreign body in the eye-ball, so on the 25th of May, the left eye was extirpated; on examination, a small fragment of shell covered with rust and weighing 0.95 gramme was found inserted between the choroid and sclerotic, on the part corresponding to the lower and outer part of the papilla. On the 31st of May, the wound of the eye healed. On the 7th of June, an artificial eye graciously presented by H. I. M. the Empress was put in. The sight of the right eye remained at $\frac{20}{200}$ but muscæ volitantes had greatly abated. On examination, it was ascertained that the turbidity of the vitreous body was nearly absorbed, but the veins of the papilla were swollen, and its inner margin presented an œdematous appearance. The retina was also congested. These neuritic symptoms persisted notwithstanding appropriate treatment. On the 27th of July, the injured man was invalided for life, and left the hospital with a grant of pension according to the regulations.

(D) INJURIES OF THE EAR.

112.—**Rupture of membrana tympani of both ears:**—T. Omori, aged 29, belonging to the crew of the starboard Hotchkiss gun of the Itsukushima; in the battle of the Yellow sea on September 17th, 1894, was at work on the fort of the starboard Hotchkiss gun on the uppermost deck, when by the shock consequent to the firing of the 32 c.m. gun, the membrana tympani of both ears were broken. By inspection with the speculum, the tympanic membrane of the left ear was uneven, with loss of brightness, the congestion was marked at its upper part, and a small perforation found in front of and above the central depression. The membrane of the right ear was perforated below the centre; perforation being somewhat smaller than that of the left, and the margin smooth. Hearing was greatly impaired in the left ear, while that of the right was but slightly deranged. An antiseptic cotton wool plug was inserted in the meatus, and the patient was ordered to keep a strict rest. In due course, the lacerated wound of the left tympanic membrane formed union, while the perforation of the right ear remained ununited. However, no marked impairment of hearing existed. The treatment was discontinued on the 20th of October.

113.—T. Uramoto, aged 24, one of the crew of the starboard Hotchkiss gun of the Itsukushima, in the same battle as above, was on the port side of the Hotchkiss gun on the uppermost deck, when by the vibration of the firing of the 32 c.m. gun, he sustained perforation of both membrana tympani. On examination, two irregular perforations about the size of a linseed were recognized above and behind the membrana tympani of the left ear, and a linear laceration extending vertically from the middle of the right tympanic membrane. Both membranes presented a slight congestion with slight pain but the hearing was only impaired in a slight degree. Antiseptic cotton wool was inserted in the meatus and the wounds healed on October 17th.

114.—S. Nakamura, aged 39, Lieutenant of the Naniwa was during the same engagement as above, commanding the starboard battery, when owing to the vibration of the discharge of the gun the tympanic membranes of both ears were ruptured. On examination, a small lacerated hole in each ear was found at the point a little above and behind the centre of the membrane, attended by a slight bleeding and loss of hearing. The meatus was protected with antiseptic cotton wool. On the 30th of the same month, these lesions healed, but resulted in the induration of the membranes and consequently dulness of hearing.

115.—**Rupture of right tympanic membrane** :—T. Hikiji, aged 21, one of the crew of a Hotchkiss gun of the Hashidate, was in the same engagement as above, engaged in firing upon the enemy's ships from the fort of the Hotchkiss gun in the rear of the uppermost deck, when owing to the shock of firing he felt a severe pain in his right ear, which has ever since been followed by impaired hearing and ringing in the ear, with a thin turbid discharge. When the ear was washed and examined with the speculum the membrana tympani were found to be perforated,—that is, a small vertical lacerated slit with a smooth margin was found in the front and lower part of the centre of the membrana tympani. The membrane was congested, and turbid, the power of hearing greatly impaired showing only $\frac{10}{200}$. The meatus was washed with boracic lotion; boracic oil dropped into the ear, and an antiseptic cotton plug was inserted. On the 30th of the same month, the discharge ceased, and the ringing in the ears somewhat decreased. On October 11th, the lacerated wound of the membrane healed leaving induration and turbidity with a power of $\frac{50}{200}$ of hearing. As it was hoped that the hearing would gradually attain a normal standard, the treatment was discontinued with the exception of the cotton wool plug which was still applied.

116.—K. Saito, aged 27, was one of the crew of a gun of the Yoshino. In the naval engagement of Phung-do on July 25th, 1894, while firing upon the enemy's vessels, the membrana tympani of the right ear was perforated owing to the vibration of the discharge of the gun. On examination, a laceration of the size of a pin's head was recognized in the front and lower part of the membrane. An antiseptic cotton wool plug was inserted in the meatus. On August 2nd, there was a slight discharge from the canal. On examination, the membrane presented turbidity with congestion around the laceration. The auditory passage was washed with a boracic lotion and a corrosive cotton wool plug was inserted. On the 13th following, the discharge ceased and the laceration healed; washing of the passage was stopped, and on the 18th, the hearing was nearly restored.

117.—T. Nagayama, aged 23, one of the crew of a gun of the Yoshin- during the naval fight of Phung-do on July 25th, 1894, while firing upon the enemy's vessels, had the tympanic membrane of the right ear ruptured by the shock consequent on the discharge of the gun. Pain in the ear and impaired hearing were complained of. The speculum showed a lacerated hole a little above the middle of the membrane. The margin of the slit as well as the auditory canal were congested. An antiseptic cotton wool plug was inserted and the case healed on the 7th of August.

118.—**Rupture of right tympanic membrane with burns of face:**—K. Saito, aged 25, belonging to the crew of No. 8 machine gun of the Naniwa was in the naval engagement of Phung-do on July 25th, 1894, standing by the No. 8 machine gun on the after part of the port side, when by the ejection of gas due to the discharge of the adjacent 12 c. m. gun, slight burns on the right temporal region and external ear were sustained. The right tympanic membrane was ruptured; a mixture of boracic acid and olive oil was applied to the burns; and an antiseptic cotton wool plug was inserted into the ear. On August 5th, the burns healed, and on the 20th the lesion of the membrana tympani recovered.

119.—**Rupture of left membra tympanum:**—M. Matsuoka, aged 27. In the naval engagement of the Yellow sea fought on September 17th, 1894, he was on the fort of the starboard Hotchkiss gun of the uppermost deck of the Itsukushima ands ustained a laceration of the left tympanic membrane by the shock of firing the 32 c. m. gun. On examination with the speculum, a perforation about the size of a linseed was found on the upper and back part of the membrane. The membrane was congested with loss of brightness and ringing in the ear and impaired hearing was complained of; (power of hearing being by a watch $\frac{100}{200}$); an antiseptic cotton wool plug was inserted in the meatus, and patient was ordered strictly to rest. On October 17th, the lacerated wound of the membrane healed and the hearing was restored.

120.—K. Iwamoto, aged 26, belonging to the crew of the starboard Hotchkiss gun of the Itsukushima, was in the same battle as above, on the fort of the Hotchkiss gun of the uppermost deck, when the shock of firing the 32 c. m. gun, ruptured the left tympanic membrane. By using the speculum, a small perforation was recognized in the middle of the membrane. There was congestion around the perforation, and the hearing was slightly impaired. An antiseptic cotton wool plug was stuffed into the meatus. The case recovered on October 19th.

121.—K. Takeda, aged 21, belonging to the crew of starboard Hotchkiss gun of the Itsukushima was, in the same battle as above on the fort of the Hotchkiss gun on the starboard upper deck, when by the shock of firing the 1 2 c. m. side-gun on the lower deck he sustained rupture of left tympanic membrane. On examination with the speculum, a grain sized perforation was found on the membrane. The membrane was slightly congested, and the hearing a little impaired. An antiseptic cotton wool plug was stuffed in the meatus and the case healed on October 17th.

122.—T. Hirai, aged 24, Midshipman of the Yoshino was in the same battle as above, acting as recorder of the engagement standing in the coning tower at the bow. By the vibration of firing the bow gun the rupture of the left tympanic membrane was sustained. On the 20th of the same month, an examination with the speculum revealed a lacerated hole on the part a little behind the centre of the membrane which was congested and turbid; the hearing was almost entirely lost (the power of hearing by a watch being $\frac{i.c.}{200}$), but without any pain or discharge. An antiseptic cotton wool plug was inserted into the meatus. On October 6th, a slight discharge came from the ear. The canal was washed with boracic lotion, and a mixture of boracic acid and olive oil dropped into the ear. At the end of the same month, the discharge had almost ceased; the lacerated wound of the membrane healed and the congestion disappeared, but the turbidity of the membrane still remained and the hearing was not entirely restored ($\frac{30}{200}$). On the 20th of November, the symptoms were greatly [illegible] d the treatment ceased.

123.—F. Takehara, aged 26, one of the gun crew of the Yoshino was in the naval battle of Phung-do on the 25th of July, 1894, engaged in firing on the enemy's vessels, when by the shock of the discharge of the gun the left membrana tympanum was ruptured. By using the speculum a transversely lacerated hole was recognized at the upper part of the membrane. An antiseptic cotton-wool plug was inserted into the meatus. Some days after, the auditory canal-became congested and a slight discharge with impairment of hearing and ringing in the ear was complained of. The canal was washed out with boracic lotion, and a mixture of boracic acid and olive oil dropped into the ear. In the middle of August, the discharge ceased, and the hearing was gradually restored, though the perforation of the membrane still remained. Washing of the ear was given up, while dropping of the boracic oil still continued. The case healed on the 31st of August.

4.—INJURIES OF THE NECK.

(A). INJURIES OF THE SKIN AND SUPERFICIAL MUSCLES.

124.—**Abrasion of the neck**:—S. Mukoyama, aged 38, Commander of the Matsushima. In the battle of the Yellow sea on September 17th, 1894, was standing on the after bridge, when a shell from the enemy exploded against the tower wall of the 32 c.m. gun. The fragments of the shell caused an abrasion on the right side of the neck. Corrosive gauze was applied. On October 3rd, the wound healed by scabbing.

125.—**Abrasion of the neck and chest**:—T. Imamura, aged 20, a seaman of the Itsukushima. In the naval engagement of the Yellow sea on September 17th, 1894, acting as a magazine party of 12 c.m. gun, was standing behind the bow-gun battery on the upper deck, when a hostile shell penetrated through the port netting in the fore part and exploded. An abrasion 3 c.m. in diameter was caused by some fragments on the left side of the thyroid cartilage, another, of the size of a 5 *rin* copper piece, at the right hypochondriac region. Sublimate gauze was applied; and the lesions healed under scabs on October 9th.

126.—**Penetrating wound of the neck with abrasion of right arm and burns of the neck**:—H. Arima, aged 21, a cook of the Matsushima. In the battle of the Yellow sea on September 17th, 1894, was engaged as a shell carrier of the after magazine; while taking a short repose on the chest in the middle part of the lower peck, a hostile shell knocked through the torpedo-chamber in the larboard-waist, the severed fragments of the wood inflicting a penetrating wound on the right side of the neck below and behind the mastoid process ; also burns of the first degree, extending from the right side of neck to the right shoulder were inflicted by the explosion of the shell. Besides, small abrasions at the upper and lower parts on the outer sides of the right arm and fore-arm were sustained. A temporary dressing was applied in the ship, and the injured was sent to Sasebo Naval Hospital on the 20th. On admission the burns had already healed ; the wound on the right side of the neck measured 3 c.m. in depth and discharged pus. On probing the wound two small wooden splinters were found and extracted. The wounds were washed with a carbolic lotion, and bandaged with sublimate gauze. On the 25th all the abrasions of the right arm had healed, but the lesion of the right side of neck presented unfavourable granulation, with copious discharge. On October 10th, the granulation of the neck wound was somewhat improved, though the discharge was still copious. About the middle of November the discharge began to decrease and the granulation developed favourably. On January 15th, 1895, cicatrization was at last accomplished, and the patient left the hospital on the 20th.

(B). INJURIES OF THE DEEP PARTS.

127.—**Penetrating wound of the neck :**—M. Imai, aged 22, a cook on board the Itsukushima. In the battle of the Yellow sea on September 17th, 1894, was acting as a magazine party of 32 c.m. gun, while he was passing along the front part of the upper deck, a shell exploded through the larboard netting in the fore part of the ship. One of the fragments penetrated through the trachea and œsophagus ; at the same time, severing the right carotid artery. Death was immediate from copious bleeding.

128.—**Perforating wound of the neck with destruction of the left eye ball :**—C. Sato, a member of torpedo magazine of the Itsukushima, aged 23 ; at the battle of the Yellow sea, on September 17th, 1894, was in the fore-torpedo-chamber, when a hostile shell exploded against the boom for the use of the starboard torpedo net ; some of the shell fragments entered the said chamber after smashing the ship's side and inflicted a perforating wound on the right side of the neck, which took the passage beneath the sterno-mastoid from the right side of the thyroid cartilage, perforating the second cervical vertebra. The cornea and sclerotic of the left eye were destroyed, the lens escaping. There were besides several burnt patches on various parts of the face and trunk. The carotid artery escaped injury, yet a copious bleeding from the wound of the neck caused enfeeblement of the pulse, but the mind remained clear without any sign of shock. The bleeding vessels were ligatured at once, an antiseptic dressing was applied, and a stimulant given internally. The temperature rose high; nausea, vomiting and drowsiness ensued, and at length he succumbed from coma at 2.25 a.m. on the 19th.

129.—**Lacerated wounds of the neck, abdomen and lower limb with extensive burns of the body**:—S. Muroyu, aged 20, one of the crew of No. 4 gun of the Hiyei. While he was firing the gun at the battle of the Yellow sea, on September 17th, 1894, a shell came over the netting of the starboard waist, and burst against the stanchion of the port booms; the fragments wounded him on the neck, abdomen and lower limbs, the neck was deeply lacerated, the larynx and the carotid vessels on both sides were mutilated, the lower jaw smashed, and the abdomen and lower limbs sustained several lacerated wounds. To make the matters worse, some of the fragments driven about ignited the powder-case carried by another member of the same gun crew. The fire thus caused caught the garment of the injured and inflicted burns over the greater part of the body so that he died on the spot.

5.—INJURIES OF THE CHEST AND BACK.

(A) INJURIES OF THE CHEST WALL.

130.—**Contusion of the chest with burns of the face**:—J. Tanaka, aged 19, a bandman on board the flagship Matsushima, in the battle of the Yellow sea, September 17th, 1894, was acting as bearer of the wounded. He was passing the tarboard side in the fore part of the upper deck, when an enormous shell burst against the shield of the No. 4 port gun in the fore part of the lower deck, at the same time igniting the ammunition provided for the use of the side gun. One of the fragments of shell hit him on the upper part of the sternum, and inflicted burns of the second degree on the left side of the lower jaw by the explosion flame. A temporary treatment was given on board the ship, and on the 20th, he was admitted to Sasebo Naval Hospital; from that time the wounds progressed favourably, and the patient recovered on the 26th.

131.—**Contusion of the right side of chest**:—Y. Murao, aged 20, one of the crew of the fore revolving gun of the Katsuragi, at the time of the bombardment of the eastern forts of Liukung Island, on February 11th, 1895. He had just turned the said gun, when he was knocked down on the deck by the shock of a hostile shell which hit the barrel of the gun; and sustained contusion on the right hypochondriac region. He complained of pain in the part on breathing and bending or extending his trunk, but there were no objective signs to be seen. Spirit of camphor was applied over the part; and rest was ordered; he recovered on the 14th.

132.—**Contusion of the left side of chest**:—M. Yoshizuka, stoker belonging to the Akitsushima, aged 22, in the battle of the Yellow sea, was descending the ladder of the engine room, when, by the shock of the firing of the ship's gun, he was thrown down into the said room and sustained contusion on the left side of chest. Symptoms of concussion were marked and he became unconscious. Resuscitation was immediately resorted to, and on examining the part no ecchymosis nor fracture were found. The thoracic organs were intact. Lead lotion was applied to the chest, and strict rest ordered. The patient recovered on the 4th day.

133.—**Contusion of the chest with burns of face, neck and hand**:—C. Inouye, one of the crew of the fore torpedo tube of the Matsushima, aged 24, at the battle of the Yellow sea, on September 17th, 1894, was in the fore torpedo chamber, when a shell burst in the fore part of the lower deck, and at the same time the ammunition provided for the use of the side gun exploded. Fragments of shells and explosion gas were thus forced into the said room, the fragments of shells contusing his left hypochondriac region and the right knee joint. The left half of the face, the neck and the backs of both hands sustained burns of the first degree. Temporary treatments were applied on board the ship, and the injured man was sent to Sasebo Naval Hospital on the 20th. At the time the burns had already healed; but the contusion of the chest had caused an abrasion. The part was swollen, and he complained of pain at the time of deep breathing and of extending or bending the body. The knee joint presented no abnormality but slight pain was complained of walking. Lead lotion was applied and rest enjoined. He left the hospital recovered, on October 10th.

134.—**Contusion of back, right forearm and left leg**:—Y. Uramoto, aged 24, one of the crew of the top-gun of the Matsushima, in the battle of the Yellow sea, on September 17th, 1894, was passing the port side of the lower waist deck carrying shells for the top-gun, when a 30.5 c.m. hostile shell burst in the fore part of the lower deck; some of the fragments struck him on the right inter-scapular region causing blood extravasation of the size of a one *yen* silver piece; slight contusions on the outer side of the right fore-arm and in front of the left leg were also sustained.

Lead lotion was applied followed by the application of spirit of camphor. He recovered on October 9th.

135.—**Abrasion of right side of chest with contusion of right inguinal region**:—M. Takehara, aged 34, petty officer acting as a member of the machine gun magazine of the Hiyei, in the battle of Yellow sea, on September 17th, 1894, was lifting shells at the entrance of the said magazine on the rear beneath the lower deck, when a 30.5 c.m. hostile shell exploded in the ward-room on the lower deck just above the magazine. The fragments of shell and broken pieces of the ship's planks fell into the magazine, and he received an abrasion from a wooden splinter on the right side of chest close to the sternum, while a fragment of shell knocked him on the right inguinal region. Luckily, owing to the presence of a tobacco pouch (with a metalpipe) in the pocket of his coat, the fragment (of an irregular triangular shape) having pierced through the coat and the tobacco pouch, was stopped by the pipe which was bent into the shape of 〈 the *kana*-letter (See the wood-cut No. 3); but an irregular oval shaped subcutaneous extravasation at the middle of Poupart's ligament was produced. By the application of lead lotion, the lesions were cured on the 21st of the month.

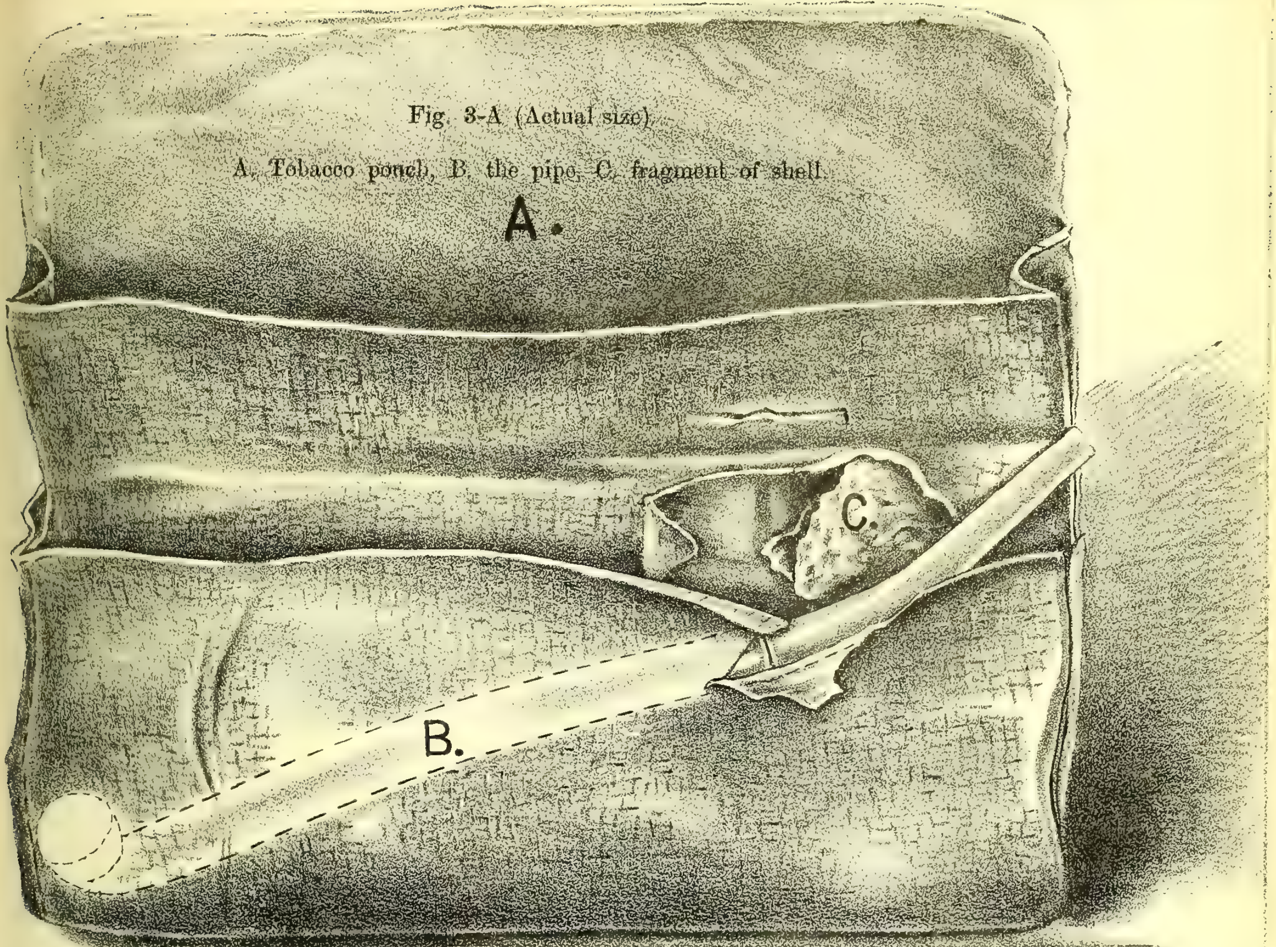
136.—**Abrasion of the back**:—S. Omura, aged 23, one of the crew of No. 3 12 c.m. gun of the Yoshino, in the battle of the Yellow sea, September 17th, 1894. While he was firing on the enemy's ships, at the fort of No. 3 gun on the starboard side of the upper deck, a hostile shell pierced through the starboard netting in the rear and burst on the quarter deck. Some of the fragments of shell were driven off so as to reach the fore part of the upper deck. One of them caused an abrasion on the part below the right scapula. Sublimate gauze was applied and sealed with adhesive plaster. The wounds healed on the 21st of the month.

137.—**Contused wound of the right side of chest**:—Y. Harada, aged 24, seaman of the Hiyei, in the battle of the Yellow sea, was, as one of a magazine party, engaged in lifting shells at the entrance of the magazine in the 3rd quarter of the lower deck, when an enormous shell, exploded in the ward-room on the 5th quarter. He received from a fragment of the shell a contused wound 2 c.m. long and 1 c.m. deep, in the posterior boundary of the right axilla. Iodoform was sprinkled on and adhesive plaster applied. The wound healed on the 20th of the month.

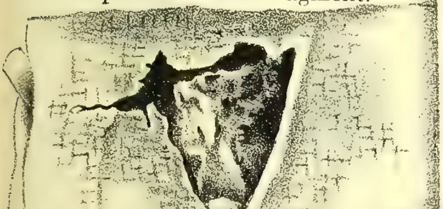
138.—**Contused wound of left side of chest, head and left leg**:—A. Ide, aged 28, Sub-lieutenant of the Matsushima, in the engagement of the Yellow

Fig. 3-A (Actual size).

A. Tobacco pouch, B. the pipe, C. fragment of shell.



Showing the posterior aspect of the pouch with the fragment.



Fragment of shell showing both surfaces.

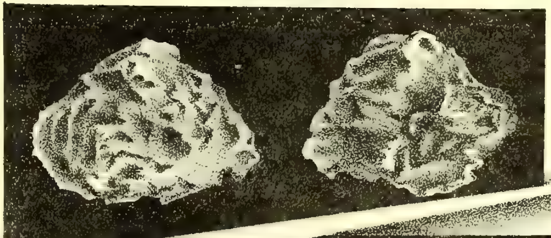
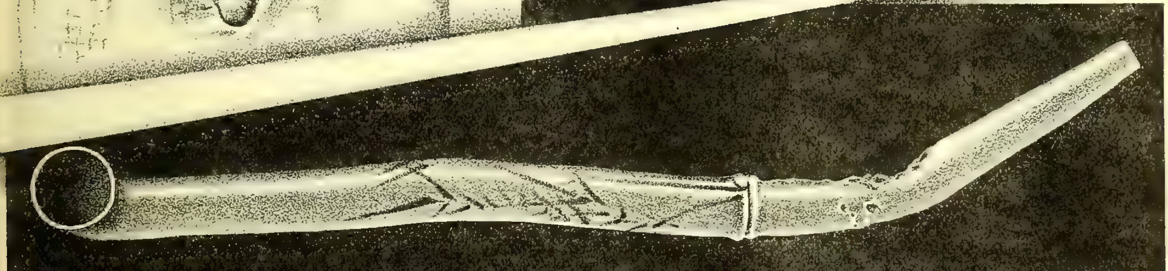


Fig. 3-B.



Tobacco pipe bent by the fragment of shell.

sea, was superintending the torpedo tubes on both sides on the waist of the lower deck, when a hostile shell pierced through the place only a few feet in front of his face; he was thrown by the shock to the side of the starboard torpedo tube. At the same time he sustained, from broken pieces of iron, contused wounds in the left hypochondriac region and in the calf of the left leg. He fainted for a while, but soon returning to himself, received treatment. Conditions of the wounds: at the end of the last rib there was an irregular lacerated wound about the size of a 2 *sen* copper, and in the middle of the calf an oval wound 6 c.m. long and 3 c.m. wide. In both cases the skin was stripped off, but neither the hard nor the soft tissues beneath were found injured; bleeding was not copious. An antiseptic dressing being applied, he soon returned to his former station. An hour after the accident he was again thrown down, together with the crew of the starboard torpedo-tube, by the shock of explosion of ammunitions for the side-gun, caused by the explosion of a hostile shell in the fore part of the lower deck; and sustained, from a piece of shell, a lacerated wound on the posterior portion of the left parietal region. It was superficial, without lesion of the skull: bleeding was rather profuse. Besides, both the hands and the face were marked with numberless small black spots caused by the powder. The wounds were washed with carbolic lotion, sprinkled with iodoform, and sublimate gauze applied. The wound of the head healed in the course of about 10 days by scab, while those of the chest and calf were much delayed by suppuration, and did not begin to heal until the formation of cicatrices commenced. The cure was completed on November 7th.

139.—**Blind wound of thoracic wall with abrasion of the left thigh**:—K. Kodama, aged 29, a member of No. 5 Q. F. gun of the Akagi, in the battle of Yellow sea, on September 17th, 1894. While firing on the enemy's ships a fragment of hostile shell flew in from the stern and inflicted a wound on the left side of the chest. On examination, the wound was found to be of an irregularly lacerated shape, 1 c.m. long and 6 m.m. wide, over the 7th rib, about 6 c.m. below the left nipple; 1 c.m. deep, reaching to the rib. There was but little bleeding, but the shock caused the patient to faint. On the outer side of the left thigh a small abrasion was found. Iodoform gauze was applied. The patient being taken on board a transport on the 19th, was admitted to Sasebo Naval Hospital on the 21st. At the time, the abrasion of the thigh had dried up and was almost healed; the wound of the chest discharged a small quantity of pus. On probing the wound, something hard was felt at the bottom. The wound was cut wide to about 3 c.m. and a rough angular piece of shell, the size of a bean was extracted. Then the rib was examined, but no fracture found, only the stripping of perichondrium of the costal cartilage. The incised margins of the wound were sutured, a drainage tube introduced and carbolic gauze applied. On the 26th, the threads were removed as the parts had formed union ; the wound however still discharged a slight pus, though the granulation was healthy. On the 28th of Octber the patient was removed to the Kure Naval Hospital. At the time, there was a granulating surface of 3 c.m. on the chest with a sinus at the bottom, leading to the roughened costal cartilage. A drainage tube was introduced and iodoform gauze applied. On the 18th November, the surface of the wound had contracted so as to leave merely a very small aperture ; but the granulation in the sinus was unhealthy, discharging a thin pus, and the healing process was exceedingly retarded, so, by the use of a sharp spoon the unhealthy granulation was scraped off and carbolic gauze applied. On December 23rd, the granulation had not yet improved and the pus discharge continued ; on enquiring into the past of the patient, he was found to have had a syphilitic history, so much so that he had even then swelling of the lymphatic glands. An application of mercurial ointment was consequently ordered. On January 17th, 1895, the use of ointment was discontinued, and internal administration of iodide of potassium ordered. From that time the granulation of the wound improved with gradual decrease of discharge, so that, towards the end of March, there remained no more than a quite superficial and small granulating surface. However, from the 30th of the same month, his mind became somewhat abnormal, showing signs of melancholia with sleeplessness. A mixture of bromide and iodide of potassium with occasional doses of chloral hydrate was prescribed, and the patient was ordered to take walking exercise in the open air. At last, on April 12th, the wound of the chest healed by cicatrization ; the mental symptoms subsiding at the same time, he left the hospital on May 9th, and resumed his duty.

140.—**Blind wound of the chest wall with abrasion of face and upper arm** :—T. Saito, aged 30, gunner to No. 17 port gun of the Fuso, was wounded, at the engagement of the Yellow sea, on September 17th, 1894, by some of the broken pieces of the funnel, the lower part of which was pierced through by a hostile shell, while he was resting cross-legged on the left side of the funnel casing. On examination, there was an oblong wound 6 c.m. long and 2 c.m. wide on the right side of chest wall extending from the 7th to the 9th rib. Its depth was 2 c.m. (the penetrating iron piece being exposed the injured man extracted it himself), the bottom reached to the costal cartilages, but without injuring them. Besides, on the right zygomatic arch, and on the upper part of the left upper arm small abrasions were found. The wounds were dressed with sublimate gauze, and, on the 21st, the injured man was admitted to the Sasebo Naval Hospital, where, by antiseptic measures, the wounds both of the cheek and arm healed under scabs on the 27th. The wound on the chest also developed a healthy granulation and progressed favourably, and on November 18th, the patient was recovered sufficiently to resume his duty.

141.—**Blind wound of the back**:—K. Matsushige, aged 23, one of the crew of No. 2 Q. F. gun of the Akagi, in the battle of the Yellow sea, was wounded on his back by one of the fragments of shell that came flying to the bridge from the starboard bow, while he was firing the port Q. F. gun on the bridge. On examination, there was a lacerated wound, 1 c.m. in length and of somewhat smaller width, below the right scapular region. The margins were ragged, and, on probing the bottom, pieces of torn cloth were found lodged inside. These were extracted, and the wound was washed with carbolic lotion and a sublimate gauze applied. On the 19th, the dressing was changed, when a slight discharge of pus appeared; on the 22nd, the discharge ceased; by the 30th, the granulation developing from the bottom became smooth. On examining the part 3 c.m. above the wound something hard of the size of a bean was felt under the skin, although no pain was complained of. The part was cut open and a fragment of shell of 6 m.m. square (as shown in the illustration No. 4) was obtained. The newly incised surface was antiseptically treated and sealed with adhesive plaster; it healed by the first intention, while the wound of the back entirely healed with a small cicatrix on October 9th.

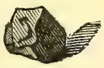


Fig. 4 Fragment of shell extracted from the wound on the back.

142.—**Perforated wound of the back, blind wound of neck and lacerated wound of right upper arm**:—M. Hamaguchi, aged 24, one of the crew of No. 1 Q. F. gun of the Akagi, in the naval engagement of the Yellow sea, while firing the gun at the starboard side on the bridge, was wounded on the back, neck, and right upper arm by fragments of a shell which came from the stern and burst against the support of that gun. On examination, the wound of the back was found to be a grooved one 1.5 c.m. deep, 18 c.m. long, and 3 c.m. wide, running from the middle of the infra-spinous region of the right scapula towards the left, and transversely crossing the spinal column. The bottom of the wound was as clean as if it had been scraped away. At 3 c.m. from this wound, another wound was found just below the left acromion process, which was round, 5 c.m. in diameter and with loss of substance; the edges lacerated irregularly; the bottom shallow, not reaching to the bone, but communicating under the skin with the grooved wound above described; bleeding profuse. In the middle of the right side of the neck there was also a blind wound 6 m.m. in calibre, and 3 c.m. in depth; no foreign body present within. At the time of injury, a large quantity of blood was brought up. Again on the outside of the lower part of the right upper arm a lacerated wound 3 c.m. long was found. To the perforated wound of the neck, a drainage tube was introduced and the other wounds were dressed antiseptically. The injured man being taken on board a transport on the 19th, was admitted to Sasebo Naval Hospital on the 21st. At the time, deglutition and phonation were difficult owing to the wound of the neck, but there was no cough or spitting of blood. The wounds on the back and arm were wide open, their margins slightly swollen. On the 27th, the discharge from the wounds decreased and the sloughs came off, presenting healthy granulation. The difficulty of deglutition and phonation disappeared. On the 30th, he was removed to Kure Naval Hospital; when the lacerated wound of the right arm was slightly discharging pus, while the wound of the neck was much contracted. The wound of the back was however still wide open, though the granulation was favourable, and a new epidermis had developed. On October 8th, the communication between the two wounds under the skin of the back was filled with granulation. On November 9th, the wound on the neck was healed by scabbing. However, those of the back and arm discharged rather copiously with dull granulation, so the nitrate of silver was applied to the granulation and iodoform gauze applied. On December 22nd, the wound over the scapula developed healthy granulation, and contracted, while that of the arm had still unfavourable granulation. On January 1st 1895, the wound of the arm had healed; and that of the back had formed cicatrix, leaving only a granulating surface, 3 c.m. long, in the middle of the back, to which boracic ointment was applied, till at last it healed by cicatrix on January 25th. The patient left the hospital on February 5th.

(B). WOUNDS OF THE THORACIC CAVITY.

143.—**Penetrating wound of left side of chest with blind wound of left leg:**—T. Kondo, aged 24, one of the crew to No. 3 7.5 c.m. gun of the Fusō, in the naval engagement of the Yellow sea, was firing on the enemy's ships from the starboard fort of the upper waist-deck, when a hostile shell burst against an iron pillar on the said deck, some of the shell fragments and broken iron pieces, wounding him on the left side of the chest and the left ankle joint. On examination, the 5th and 6th ribs along the left axillary line were found to be broken, the wound penetrating into the thoracic cavity and bleeding profusely. An iron piece penetrated through the outer side of the left ankle into the joint, making a blind wound; moreover, another piece was inserted in the back of the middle of the left leg. The injured man was pale, with a very weak and intermittent pulse, and complained of acute pain in the chest. The foreign body in the wound of the ankle was extracted; both wounds were antiseptically dressed, and the patient was kept in strict rest. On the 18th, the temperature indicated 38° C. An accumulation of blood in the pleural cavity was evacuated and the cavity examined, but no foreign body could be found. The lungs escaped injury, and there was no hæmoptysis. The patient however succumbed from collapse at 8 a.m.

144.—**Penetrating wound of the chest with blind wound of left thigh:** —U. Tsushimi, aged 35, gunner to No. 6 Hotchkiss gun of the Akitsushima, in the battle of the Yellow sea, sustained a penetrating wound on the back, and a blind one on the thigh from the fragments of a shell which exploded against the shield of starboard No. 5 side-gun on the waist deck. On examination, a contused wound, 5 c.m. long and 2.5 c.m. wide, was found running from the right side of the 6th dorsal spinous process to the left and upward, reaching deep into the thoracic cavity; breaking in its course a rib in the infra-scapular region. On breathing or moving his body, an intense pain was felt in the left hypochondriac region, and respiration was embarrassed. The margin of the wound gave a sensation as if a mass of snow was being pressed on it; blood mixed with air-bubbles escaped from the wound, indicating injury of the lung. On the upper part of the outer side of the left thigh a vertical lacerated wound 3 c.m. deep was found and a fragment of shell inserted in it was extracted. The wounds were antiseptically treated, and the patient kept at strict rest; he could not sleep that night for the constant anguish over the prœcordial region as well as the actual pain in the chest. On the 18th, the temperature indicated 38°C., and coughing was frequent; a dose of morphine given; urine withdrawn by catheter. On the 19th, the patient was taken on board a transport, and sent to Sasebo Naval Hospital on the 21st. At the time, coughing was frequent, with bloody expectoration and acute pain in the left side of chest; there was also a subcutaneous emphysema, extending from the left scapular region to the axilla, which, on percussion, was foun to present a slight dulness at its lower part. The chest was kept at rest with a tight bandage, and an antispasmodic mixture internally given. On the 27th, the subcutaneous emphysema had greatly subsided; coughing became less frequent, and the bloody expectoration also diminished. On October 2nd, granulation filled up the wound and the discharge lessened; the subcutaneous emphysema entirely disappeared; coughing now became very slight, and no more traces of blood were found in the expectoration. On the 17th, the wound became contracted, and on November 26th, was completely healed. The wound of the left thigh healed by scabbing soon after admission to the hospital.

145.—**Perforated wound of the chest and abdomen**:—S. Suyehiro, aged 31, gunner to No. 4 gun of the Hiyei, in the battle of the Yellow sea, was firing No. 4 gun on the port side, when a hostile shell burst against the stanchion of the port booms. A fragment of the shell inflicted a mortal wound which pierced through the left side of the thoracic cavity, breaking the ribs in its course, and passing out on he right side of abdomen. He died immediately from the great loss of blood.

146.—**Perforated wound of the thorax**:—S. Nishida, aged 44, warrant officer of the Banjō. While he was firing on the enemy's vessels in the harbour of Wei-hai-wei from the occupied fort of Luchotsai, on February 3rd, 1895, a bomb-shell discharged from the enemy's ship Laiyuen, exploded in front of that fort. One of the fragments pierced the front of left side of chest and passed out on the right side of the back, breaking the ribs in its course and injuring the thoracic visceræ with copious bleeding. Death was instantaneous.

147.—H. Minatsu, aged 22, stoker of the Itsukushima, was wounded in the chest at the battle of the Yellow sea, by a fragment of a shell that pierced through the port netting in the fore part and exploded when he was on the grating at the uppermost part of the fore boiler room. The fragment crushed through the 3rd rib in front of the right side of the chest and passed out by the back on the left side, thus causing a large perforated wound. In consequence of an excessive loss of blood, the injured man expired on the spot.

148.—**Perforated wound of the thorax with burns of head and face**:—H. Kikuchi, aged 27, a torpedo-man on board the Itsukushima, in the battle of the Yellow sea, was in the torpedo-chamber of the fore part, when a hostile shell exploded against the torpedo-net boom breaking the ship's side. The fragments dashed into the chamber and inflicted a perforated wound on his thorax, piercing through the front of the left side of the chest, breaking the 4th rib and passing out by the back. Burns of the head and face were also sustained. He died on the spot.

149.—**Perforated wound of the thorax and upper arm**:—K. Yanagiwara, aged 30, senior blacksmith of the Itsukushima, in the battle of the Yellow sea, was in the fore torpedo-chamber, when an enemy's shell exploded against the torpedo-net boom and crushed the ship's side. The fragment of shell entered the torpedo-chamber and inflicted a large perforated wound of the chest, piercing the front of the right side of the chest wall, breaking ribs and finding an exit at the back. There was another perforated wound in the middle of the left upper arm; excessive bleeding occurred from both wounds, yet his mind was very firm. When a nurse came to his assistance, the injured man took out from his pocket the key of his tool-drawer and said:—" This is an important key and if this be not found after my death, it will cause great trouble, so please deliver this to the officer in charge." No sooner had he said this than he lost consciousness and expired!

150.—**Perforated wound of the thorax, and left thigh with burns of face and neck**:—S. Yamaguchi, aged 24, one of the crew of the fore torpedo on board the Itsukushima, in the battle of the Yellow sea, was in the fore torpedo-chamber, when a hostile shell exploded against the torpedo-net boom and crushed the ship's side. Some of the shell-fragments that entered the torpedo-chamber inflicted on him a perforated wound in the left side of the chest, also another one in the middle of the left thigh, with burns on the face and neck. He died on the spot.

151.—**Perforated wound of thorax with fracture of dorsal vertebræ**:—K. Nishimura, aged 33, petty officer on board the Amagi, in the bombardment of Wei-hai-wei, while firing on the enemy's vessels in the harbor from the occupied fort of Luchotsai, on February 3rd, 1895, was wounded by one of the fragments of a bomb discharged from the Saiyuen. The missile entered by his back and found exit in the front of the chest thus inflicting a perforated wound; the dorsal vertebræ were broken and the lungs severed. He died on the spot.

152.—**Mutilation of thoracic wall and lower limbs with burns of whole body**:—J. Inouye, aged 27, crew of the port search-light of the Matsushima, during the battle of Yellow sea, was engaged in temporarily repairing the electric firing apparatus on the fort in the fore part of the lower deck, when a hostile shell exploded against the shield of No. 4 side-gun on the port side of the same deck and ignited the ammunition provided for the side-gun. By some of the fragments and by the explosion of the ammunition his chest wall was mutilated and the lower extremities crushed with burns of his whole body, causing instant death.

153.—A. Takenaka, aged 21, crew of the No. 4 gun of the Hiyei, in the engagement of the Yellow sea, was standing with the powder-case hung about his chest by the No. 4 gun on the port side of the waist-deck, when a hostile shell came flying over the netting of the starboard waist, and burst against the stanchion of port booms. One of the fragments hit the powder case and exploded the ammunition in it, thus his chest wall and the thoracic visceræ were crushed and the lower extremities mutilated and the whole body burnt. He died instantaneously.

154.—**Mutilation of thoracico-abdominal region and lacerated wound of right thigh**:—S. Sunagawa, aged 30, crew of No. 4 gun of the Hiyei, in the battle of the Yellow sea, was firing on the fort of the gun on the port side of the waist-deck, when a hostile shell came flying over the starboard waist netting, and exploded against the stanchion of the port booms. By one of the fragments, he was injured with a deep lacerated wound on the inner side of the lower third of the right thigh, complicated with an injury to the femoral artery. Bleeding was stopped immediately by one of the ambulance men who compressed the artery and conveyed the wounded man to the surgery in the ward-room in the after part of the lower deck. During the surgical operation, another shell exploded in the room, by some large fragments of which the chest and abdomen were smashed, the thoracic as well as the abdominal visceræ being torn to pieces. He died on the spot.

155.—**Mutilation of the chest and abdomen**:—S. Imabara, aged 31, crew of the port 9-pounder of the Tsukushi, in the bombardment of Zhih Island on February 3rd, 1895, was standing on the left side of the funnel on the upper deck, when a hostile shell hit his trunk, mutilating the chest and abdominal walls together with the organs inside. Death was instantaneous.

6.—INJURIES OF THE ABDOMINAL AND LUMBAR REGIONS.

(A). INJURIES OF THE ABDOMINAL WALLS.

156.—**Contusion of abdomen**:—S. Tanaka, aged 20, crew of No. 5 Q.F. gun of the Akagi, in the battle of the Yellow sea, was wounded on the right side of the abdomen by a fragment of a shell that came flying by the stern, while he was firing on the starboard side in the rear of the upper deck. On examination, there was an abrasion in front of the right anterior superior iliac spine but no injury to the abdominal visceræ. Carbolic dressing was applied. On the 30th of the same month the abrasion healed by scabbing.

157.—**Contusion of right lumbar region** :—K. Matsunaga, aged 24, crew of No. 9 gun of the Hiyei, in the engagement of the Yellow sea, was firing on the fort of the gun at the stern, when a hostile shell pierced through the upper part of the port on the starboard side of the stern. From the splinters of wood he sustained contusion on the upper part of the crest of the right ilium. Spirit of camphor was applied and the wound was healed on the 19th of the same month.

158.—**Contusion of left lumbar region** :—S. Nagaoka, aged 34, petty officer on board the Hiyei, was handling the rudder by the wheel on the quarter-deck, in the battle of the Yellow sea, when an enormous shell exploded in the ward-room at the rear of the lower deck. He was thrown down, and in falling sustained small contused wounds over the left lumbar and sacral regions. Iodoform was sprinkled and adhesive plaster applied. On the 21st following, the wounds were healed.

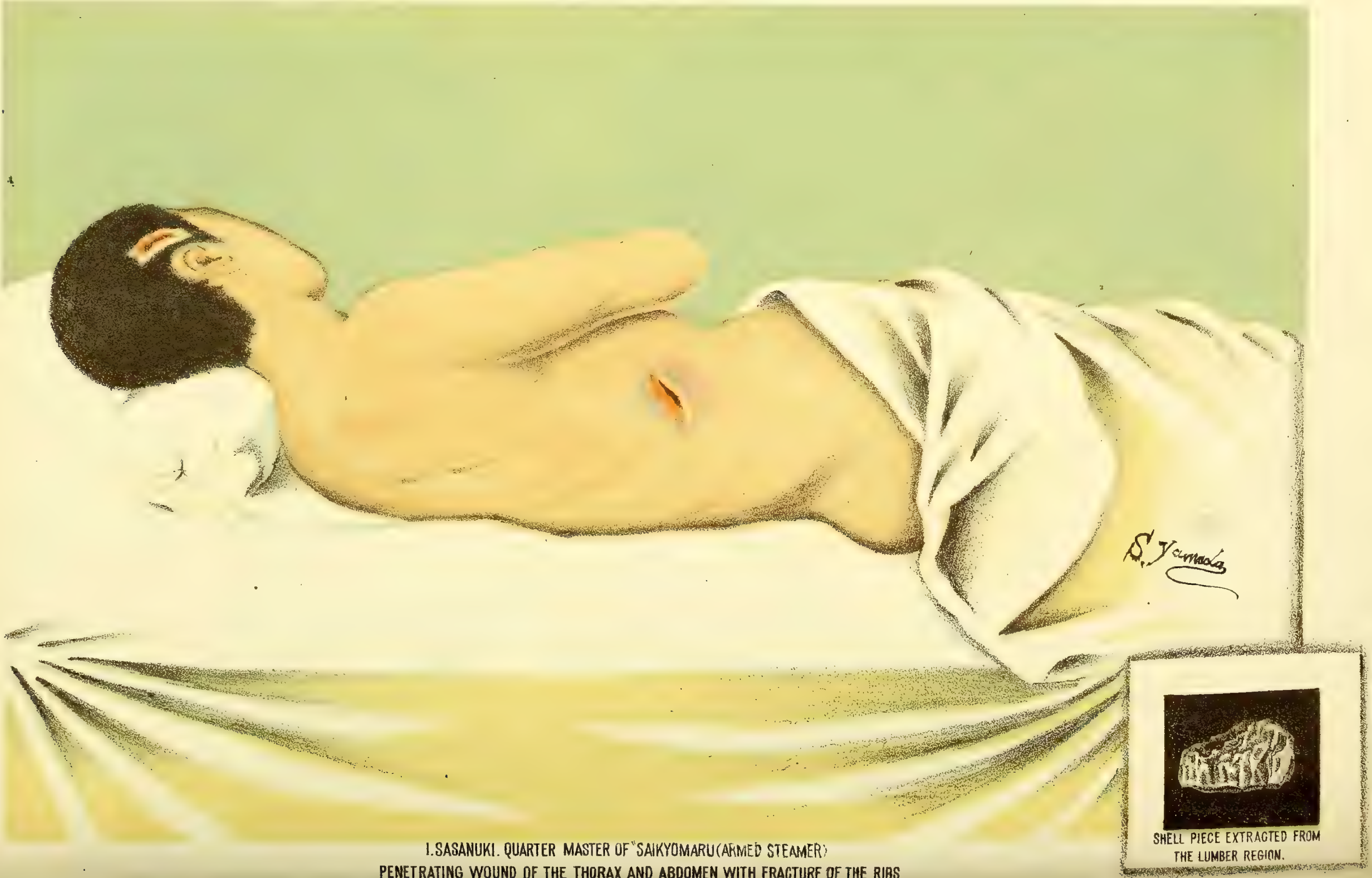
159.—**Lacerated wound of the right lumbar region** :—R. Ishii, aged 24, Assistant Navigating Officer of the Matsushima, during the bombardment of the eastern fort of Lieukung Island, on February 7th, 1895, was engaged in measuring distances on the fore bridge; when a hostile shell flying over the bridge inflicted a lacerated wound midway between the right iliac crest and the costal arch, 15 c.m. in length and 9 c.m. in width. The skin, subcutaneous tissue and superficial layer of the muscles were scraped away; exposing the muscles at the bottom of the wound; the margins were of an irregular shape and from the posterior half of the upper margin hung a flap 6 c.m. long and 5 c.m. wide; while all around the wound were the black marks of burnt powder. The bleeding and pain were not severe; no injury of the abdominal visceræ was to be seen. The wound was cleansed with carbolic lotion; the flap arranged to cover the wound and sublimate gauze applied. On the 8th, he was transferred to the hospital-ship Kobe-maru. In a few days, the wound suppurated; the flap and margins of the wound presented gangrenous conditions, which had to be scraped off. On the 14th, granulation gradually developed and the wound became even and clean. On the 20th, he was admitted to the Sasebo Naval Hospital. At the time, an oval granulating wound was present on the right lumbar region extending, above, one inch below the costal arch; below, about three and a half inches above the great trochanter of the femur ; in front, about half an inch above the anterior superior iliac spine ; behind, to within two inches from the lumbar vertebræ. The vertical diameter was 10 c.m. and the antero-posterior diameter 15 c.m. ; the bottom was exposing muscles and dotted here and there with pustular spots. On the 25th, the granulation was healthy, but in its anterior portion bled freely. The application of iodoform and sublimate gauze was resorted to. The granulation afterwards developed so as to fill the wound, yet the growth of epidermis was very slow. On April 12th, the granulation presented tranverse diameter 14 c.m., and longitudinal 10 c.m.; three small pieces of skin were grafted there. On the 16th, the dressing wås renewed, when the skin grafts appeared to be growing ; but subsequent suppuration of the granulating surface prevented their growth. On May 11th, the granulation became healthy and the discharge decreased : three pieces of skin grafts were again tried with aseptic precautions. After that the epidermis spread gradually. On June 10th, the temperature rose to 38°.4 C. with slight chilliness. On examination, the wound was found to have a slight discharge of pus, and the granulation to have in two places yellow patches of the size of a 2 *sen* copper, speckled with black here and there. When the patches were scraped and examined with a microscope, they showed countless streptococci, but the margin of the wound exhibited no signs of inflammation or suppuration. So 10 per cent carbolic lotion was applied to the patches and a weaker lotion of carbolic compress applied over the granulation. On the 11th, the temperature fell to normal : though the colony of streptococci were somewhat extended, yet the coloured patches had diminished a little. On the 14th, the colony entirely disappeared but on the 19th, the surface was again covered, one-third of it being discoloured with copious pus discharge. The use of 10 per cent carbolic lotion was again resorted to. After the 24th, the granulation resumed a healthy state, and on July 12th four bean-sized pieces of skin were grafted. All these grafts took well and on the 20th August the whole surface was covered with skin. The injured officer left the hospital on the 23rd.

160.—**Concussion of spine and sprain of ankle joints** :—H. Kawamura, aged 45, Surgeon in chief of the Standing Squadron of the flagship Matsushima, in the battle of the Yellow Sea, on September 17th, 1894, was attending wounded cases in the surgery on the fore part of the upper deck, when a 30.5 c.m. shell exploded against the shield of No. 4 side-gun on the port side of the fore part of the lower deck, at the same time igniting the ammunition provided for the side-gun. By the shock of the explosion, the upper deck was tilted and torn up just where he was standing, causing concussion of the lumbar vertebræ and sprain of the ankle joints. There was an intense pain at these parts and paresis of the lower extremities so as to prevent his standing while he was being carried to the cabin : frequent attacks of spasms occurred with extreme pain in the loins. Swelling and intense pain of the ankle joints and feet, with constricting sensation around the abdomen, and slight numbness of both lower limbs, appeared toward the night of the accident. On the 21st, he was admitted to Sasebo Naval Hospital. At that time, the temperature was 38° C.; pulse 78 ; the tongue furred ; appetite impaired, attended with nausea ; yet the thoracic and abdominal visceræ were sound. On examination, hyperæsthesia over the 4th lumbar vertebra and lumbo-sacral joint was found. On the 23rd, the temperature indicated 38° C., pulse 76 ; the nausea still continued and the appetite was not restored yet ; the swelling of ankle joints decreased a little yet the pain did not subside at all. Urine was cloudy, and on examination no abnormal constituents were found. On the 26th the temperature stood at 37.°6 C.; the nausea had subsided ; the constricting sensation had disappeared in the abdominal region, also hyperæsthesia of the lumbar region subsided. The swelling of the right ankle was diminishing by degrees, while the swelling of the left side had undergone no remarkable change. On the 30th, the sensation of both extremities was found restored to its normal state as regards the sense of touch, but analgesia persisted so that no pain was felt if the skin was pinched. The sensation of warmth over the spinal cord being tested, the sensation of cold was normal but that of warmth was very acute over the 3rd and 4th lumbar vertebræ. On the 4th of October, the temperature still stood at 37.°6 C.; the swelling of the ankle joints subsided remarkably so as to produce wrinkles in the skin in those parts—especially on the right side. By this time, the calves became slightly emaciated, and the tendon reflex of the knee increased. By the 18th, the analgesia of the lower extremities had greatly subsided ; the patellar reflex likewise was lessened, and the swelling of the ankles greatly decreased. Walking was first tried on this day, but it proved a failure owing to the pain felt at the ankle joints whenever they were moved. On the 26th, temperature became normal, the swelling of the right ankle completely disappeared, only a slight swelling of the left ankle still remained; squatting on the bed and bending the body caused a sensation of pressure over the 3rd lumbar vertebra. When he tried to walk pain was felt in the soles of the feet. On November 10th, all symptoms were relieved ; walking in the room still caused the sensation of pressure over the

3rd lumbar vertebra and the pain in the deep part of the left ankle. After this time, progress was favourable and he could walk about 30 yards. However, on the night of December 8th, a pain was felt at the loins, and on the next morning an oval swelling 6 c.m. in vertical diameter and 4.5 c.m. in transverse diameter appeared on the right side of the 3rd lumbar vertebra, but with no inflammatory symptoms. To the touch, the swelling proved to be uniformly hard with tenderness on hard pressure, and a dull pain was elicited in the movements of body. On the 25th, the swelling around the left ankle still lingered, a thickening just below the outer malleolus remained and pain of the joint was caused by the eversion or inversion of foot, showing that the power of walking had not yet been restored to its normal condition. In this condition he left the hospital on the 30th. The walking power was subsequently nearly restored to its normal state.

(B). PERFORATED WOUND OF ABDOMINAL CAVITY.

161.—**Penetrating wound of the right side of chest and abdomen, blind wound of left leg and contused wound of head and left forearm :—** I. Sasanuki, aged 40, quarter-master of the Saikyo-maru, in the battle of the Yellow sea, September 17th, was standing by the telegraph on the aft uppermost deck to send an order to the rudder, when a hostile shell hit the last boat davit on the starboard quarter. He was wounded by some of the fragments on the head, chest, upper and lower extremities. On examination, there were found (1) a valvular wound 8 c.m. in length running transversely over the right temporo-parietal suture; the margins irregular, the depth 6 c.m. downwards perforating the occipito-frontalis and abrasing the periosteum yet without fracture of the bone; (2) at the right 9th intercostal space, a lacerated wound 3 c.m. long running obliquely backward and downward extending from the anterior to the posterior axillary lines; the margins irregularly torn, the 10th rib broken, losing some 1.5 c.m. of bone substance, and the bottom of the wound apparently perforating the liver; (3) a small shallow contused wound on the front aspect of the middle of the left fore-arm; (4) a lacerated wound 2 c.m. long on the inner side of the lower third of the left leg; the margins were ragged, the depth reaching as far as under the skin of the opposite side, where the presence of a solid substance was recognized; a counter-opening was made and a fragment of shell, of an irregular-shape, 2.4 c.m. in vertical diameter, 2 c.m. in transverse diameter, and 1 c.m. in thickness was extracted. A piece of cloth was adhering to the fragment (see the illustration No. 5).



SHELL PIECE EXTRACTED FROM THE LUMBER REGION.

I. SASANUKI. QUARTER MASTER OF "SAIKYOMARU (ARMED STEAMER)
PENETRATING WOUND OF THE THORAX AND ABDOMEN WITH FRACTURE OF THE RIBS

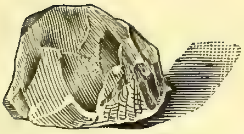


Fig. 5 Shell fragment extracted from the left leg (cloth adhering)

All the wounds were antiseptically treated, and to the perforating wound of the leg a drainage tube was introduced. On the 18th, the temperature was normal; with no bad signs except slight pains about the wounds. On the 19th, he was transferred on board a transport, and admitted to Sasebo Naval Hospital on the 21st. On admission, the wound on the right side of the chest was discharging a yellowish thin fluid and the patient complained of pains in the chest and coughing. The broken ends of the rib were sharp and irregular; the bottom of the wound reached deep into the liver preventing thorough examination. The sharp ends of the rib were pared off. All the other wounds progressed favourably. On the 23rd, the dressing of the chest wound was changed; when the bile came out from the wound, which presented a darkreddish colour. The wound of the leg also discharged a little pus, but those of the head and of the fore arm speedily developed granulation. On the 27th, by probing into the chest wound, a piece of bone flat and rough, of the size of a bean, was extracted. The peritoneal covering of the liver was abrased and a part of the liver substance injured. The wound was washed with a carbolic solution, and an iodoform gauze applied. The temperature rose a little. On October 1st., some of the decayed covering and liver substance came out of the wound. The wound was cleansed and an antiseptic dressing tightly applied. On the 2nd, an oval elevation of skin was found on the right side between the first and second lumbar vertebrae, which moved to the touch and gave a sensation of some solid substance. The part was opened with antiseptic precaution and a fragment of shell, of an irregular rectangular shape, about the size of a bean was extracted. As regards its course, whether the fragment had entered by the chest wound or had taken a different course by passing round the ribs, cuold not be ascertained. The incision was healed on the 6th. On the 7th, the discharge from the chest wound was the same as before, decayed liver substance came out mixed with bile emitting a peculiar smell somewhat like peptone. In the right infrascapular region, dulness on percussion and a slight friction was revealed, accompanied with cough; the patient became anæmic and debilitated. A mixture of iron and quinine was internally given. On the 15th, the discharge from the chest wound greatly decreased; two pieces of sloughs were taken out. The perforating wound of the leg became narrowed by the granulation, so the drainage tube was replaced by a strip of sublimate gauze. With the wounds of head and fore-arm, the pus discharge ceased, and the granulation surface became contracted; the temperature rose slightly during the night. On the 27th, the wound of the forearm cicatrized; that of the chest developed granulation so that the part became clean and contracted, and no longer discharged sloughed hepatic substance; a slight discharge of pus and bile, however still continued. On the 2nd of November, the chest wound still discharged bile, though all the other conditions were favourable. The friction sound completely disappeared, but the dulness persisted over the infra-scapular region. On the 15th, the temperature suddenly rose to 39° C.; on examining the wound of the chest a dead piece of bone the size of a pea and a slough of liver, plugging the orifice and preventing the escape of pus, were observed. These were removed and 15 gramme of a greenish pus evacuated. The next morning the temperature fell to normal, and the discharge ceased gradually. The wound of the head contracted to the size of a 5 *rin* copper and the pus discharge entirely ceased. On the 2nd of December, the wound of the leg was completely healed, and that of the head had contracted to the size of a bean, while that of the chest reached to a depth of 3 c.m.; but the discharge was nearly stopped and granulalion was healthy. On the 20th, the chest wound formed a cicatrix, and the head wound healed by scabbing on January 7th, 1895. On the 11th, he had so completely recovered as to be able to rejoin the ship. (See the illustration.)

162.—**Penetrating wound of the left side of chest and abdomen with perforated wound of left arm**:—S. Ito, aged 21, seaman of the Saikyo-maru, in the battle of the Yellow sea, on September 17th, 1894, was firing the 57 m.m. Q.F. gun in the rear of the uppermost deck, when a hostile shell exploded against the aftermost boat davit on the starboard quarter; some of the fragments wounded the left side of his chest and left arm. On examination, a lacerated wound 3 c.m. long was found over the 8th rib on the left axillary line; the margins were ragged and widely open; the wound took a course forward and downward, breaking the 10th rib, and penetrated into the thoracic cavity. Another perforating wound was seen just above the left elbow joint passing from the outer side of the upper arm to its inner side. The opening of the wound on the outer side was of an irregular form, measuring 6 c.m. vertically, and 4 c.m. laterally; while the exit on the inner side was 2.7 c.m. long, and opened irregularly; but the humerus was intact, and no heavy bleeding occurred, as the brachial artery had escaped injury. After antiseptic dressing, the man was ordered to have strict rest. On the 18th, pain was felt in the lower part of the abdomen, and the temperature rose to 38° C. The dressing was changed, and a solution of morphine injected subcutaneously; and cold applied to the abdomen. On the 19th, he was sent by a transport to the Sasebo Naval Hospital. On the way, the symptoms aggravated, abdominal pain becoming intense, temperature rose to 39° C.; pulse 105. In the night nausea and vomiting ensued, showing characteristic signs of peritonitis. The dressing was changed again. The chest wound was slightly inflamed. An opiate was given internally, and cold constantly applied to the abdomen. On the 21st, he was admitted to the hospital. Symptoms at the time; expression pale and full of anguish, nutrition of the body impaired, respirations uneasy; slight cough; sputa mixed with blood; abdomen tympanitic, yet the temperature not exceeding 37°.3 C. On the 22nd; the temperature stood at 37°.4 C., pulse 78, respiration 18 to 24 per minute; there was no remarkable change of symptoms. On the 23rd symptoms aggravated:—the temperature rose to 39°.6 C., limbs cold, pulse weak, numbering 120, respiration laborious, tympanites; and pains in the chest and abdomen increased so that extreme uneasiness was complained of. The dressing was changed, and an enema of turpentine, yolk of egg and gum mucilage was injected. On the 24th, the pain of the chest steadily increased, attended with a slight hæmosptysis. Sloughs around the lacerated margin of the chest wound discharged pus, and gas in the abdomen increased steadily, so that the chest and abdomen were intensely distended, and the patient was in a state of constant anguish and groaning. Temperature 38°.6 C., pulse 92; the enema of turpentine was repeated and application of ice to the chest and abdomen continued. Laparotomy was hopeless, as the condition of the patient at the time of admission was so low. On the 25th, the thermometer stood as the day before; pulse 100, exhaustion increasing day by day. Egg and brandy was given at frequent intervals. On the 26th, a large quantity of blood was passed through the bowels; the symptoms were perilously aggravated, the patient collapsed, and the temperature indicated 39°.4 C. On the 27th, the temperature indicated 38°.6 C.; vomiting had occurred frequently since the previous day, and much bile had been brought up; pulse became rapid and thready, and the pain in the abdomen excruciating; the patient was constantly crying and groaning. Thus, in spite of all efforts to alleviate his distress, he succumbed at 8.30 p.m.

163.—**Penetrating wound of abdomen with burns of face, hands and feet**:—Y. Ogawa, aged 24, a bandsman on board the Matsushima, in the battle of the Yellow sea, September 17th, 1894, was passing the fore-part of the lower deck on duty as a carrier of the wounded, when a 30.5 c.m. hostile shell burst against the shield of the port No. 4 gun in the fore-part of the lower deck, and ignited at the same time the ammunition provided for the side-gun. He sustained burns of the first degree on the face, and on the dorsa of both hands and feet; also one of the fragments of shell inflicted a penetrating wound on the left abdominal region. On the 20th, he was admitted to the Sasebo Naval Hospital, at which time, the burned parts presented a dark reddish colour. The wound of the abdomen was of a round shape, the size of one *yen* silver, at a spot 7 c.m. to the left and below the umbilicus: in the middle of wound another small hole penetrating to the abdominal cavity was noticed. Symptoms of peritonitis had already set in, as the tension and severe pain of the abdomen, nausea and vomiting had for some time been going on. Antiseptic measures were taken for the wound, application of ice to the abdomen and internal administration of anodyne were resorted to. On the 25th, the burns healed; and the peritonitic signs slightly abated. But exhaustion increased gradually and at last he died on the 28th of October.

164.—**Penetrating wound of abdomen with blind wound of the left thigh**:—Y. Matsumoto, aged 24, stoker of the Itsukushima, in the engagement of the Yellow sea, was working in the after boiler room, when a shell pierced through the starboard coal bunker in the waist and exploded against the ladder in the boiler-room. One of the fragments of shell inflicted a penetrating wound in the middle of the abdomen; another one, a small blind wound in the left thigh. The injured man died on the spot before assistance was given.

165.—**Penetrating wound of abdomen with fractures of the humerus, thigh and leg**:—K. Kimura, aged 24, stoker of the Itsukushima, during the engagement of the Yellow sea, was on the highest grating of the fore boiler-room, when a shell exploded, after piercing through the port netting in the fore part; the fragments of shell inflicted the following wounds: a penetrating wound of the abdomen below the umbilicus, the size of a two *sen* copper, from which the bowels came out; and compound fractures in the middle of the right upper arm in the lower part of the left thigh and on the left leg. The injured man died instantly from the shock.

166.—**Penetrating wound of abdomen with fracture of the ilium**:—K. Narabara, aged 36, petty officer on board the Itsukushima, during the battle of the Yellow sea, was in the torpedo-chamber in the fore-part, when a hostile shell exploded, striking the torpedo-net-boom on the outer side. The fragments breaking through the ship's side dashed into the torpedo-chamber, where one of them gave him a penetrating wound on the right iliac region, from which the intestines escaped; and a portion of the anterior superior spine was broken. Thus the injured man died on the spot, owing to the great loss of blood, and shock.

167.—**Penetrating wound of sacro-iliac joint**:—J. Umimichi, aged 21, a seaman of the Hiyei, in the battle of the Yellow sea, was stationed at the relieving tackle in the cabin on the after-part of the lower deck, when an enormous shell exploded in the ward-room. The fragments scattered about, greatly damaging the cabin, and one of the wooden splinters wedged itself into the man's sacro-iliac joint. As all the surgeons on board were killed at that very moment, he had simply to be dressed by one of the crew, until the proper treatment was given by the surgeons from the other ships, when the ship arrived next morning at the naval station near Cape Choppeki. On examination, a wooden splinter was found wedged in between the left sacro-iliac joint, the entrance wound measured 5 c.m. long and 3 c.m. wide; and the margins were lacerated. On trying to extract the piece with a forceps it was found no easy matter; so after the application of an antiseptic dressing, the patient was ordered to keep rest. Soon after the injury, paraplegia of the lower extremities and incontinence of urine followed. On the 19th, he was removed to a transport to be transferred to the Sasebo Naval Hospital. On admission, the wound discharged copiously; both the sacrum and ilium being broken at the joint, presented the shape of ragged rocks; pain extreme at the slightest movement of the body; urine passed incontinently. On the 22nd, under chloroform, the wound was slightly widened and the wooden splinter wedged into the joint extracted. However, the piece was so tightly inserted that only a part of it and some broken pieces of bone were extracted, and that only by main force. On probing the bottom of the wound further, it was found that the rest of the splinters, by forcing itself into the joint had reached the pelvic cavity. At this point the operation was stopped for the day, and the wound cleansed by an antiseptic solution; the temperature indicated 39°. 2C. in the night; evacuations passed unconsciously, and the urine contained blood. Copious discharges from the wound frequently soiled the dressing. On the 25th, the remaining piece of wood was extracted under chloroform; and the bladder washed out by a solution of boracic acid. Every effort was made to keep of the patient's strength both by food and tonics, and from that time, the temperature ranged between 38° and 39°C. The discharge from the wound was profuse; urine mixed with blood and pus passed involuntarily, so that the exhaustion aggravating day by day, the patient at last died on the 10th of October.

168.—**Perforating wound of abdomen**:—S. Nakano, aged 39, Lieutenant Commander of the Tenryū, during the bombardment of Liukung Island on February 11th, 1895, was standing on the commanding tower on the starboard side of the bridge, when a hostile shell exploded, striking the No. 2 port gun at the middle of the upper deck; by one of the fragments of shell that flew up to the bridge, he was pierced through the abdomen and thrown overboard: death was instantaneous.

169.—R. Nagata, aged 28, Lieutenant of the Akitsushima, in the battle of the Yellow sea, was commanding the port battery, standing by No. 6 side-gun on the port side of the waist-deck, when a hostile shell exploded, hitting the shield of No. 5 side-gun on the starboard; by some of the fragments of shell, he was pierced through from the abdomen to the loins, and in consequence of a profuse hæmorrhage and of the shock, expired on the spot.

170.—M. Shida, aged 28, a gunner of No. 5 side-gun of the Akitsushima, in the battle of the Yellow sea, was firing No. 5 side-gun on the starboard of the waist-deck, when a hostile shell exploded against the shield of that gun. One of the broken shell-fragment, inflicted a perforating wound in his abdomen, and he died on the spot owing to heavy hæmorrhage and the shock.

171.—**Perforating wound of lumbar region**:—T. Hashiguchi, aged 24, Midshipman of the Akagi, in the battle of the Yellow sea, was on the fore top measuring the distances of the hostile vessels, when a shell from the enemy pierced him from the loin to the abdomen, breaking the lumbar vertebræ and pelvis. Owing to the great hæmorrhage caused by the rupture of the abdominal aorta, he died on the spot.

172.—**Perforating wound of the lumbar region with blind wound on the back**:—M. Mumabuchi, aged 26, a carpenter of the Akagi, in the battle of Yellow sea, was stationed as a fire-brigademan on the fore-part of the lower deck, when a hostile shell exploded on that deck. One of the fragments inflicted numberless wounds in the back, and a perforating wound in the loins, with the fracture of the lumbar vertebræ, causing a heavy hæmorrhage. He was killed on the spot.

173.—**Perforating wound of the lumbar region with lacerated wound of the leg**:—K. Fukuhara, aged 24, one of the crew of No. 1 short 7.5 c. m. gun of the Fusō, in the course of the bombardment of Zhih Island February 7th, 1895, was standing by the side of No. 1 7.5 c.m. gun in the fore part of the upper deck, when a hostile shell pierced through the starboard side of the gallant-forecastle and burst in the fore part. One of the broken pieces inflicted a perforating wound passing from the left loin to the right inguinal region, breaking the ilium in its course, and found its way out to a spot above the right Poupart ligament. From the exit a portion of lacerated intestine protruded. Several pieces of broken bone, were found in the wound, of which one — a fragment of the crest of ilium — was not less than 9 c.m. in length. Further, in the middle of the outer side of the left leg, there was a lacerated wound, but without any lesion of the bone. Besides the wound of the intestines just mentioned several other parts were found to be wounded; to suture all of them would have taken much time to the neglect of other patients, so the intestines were, for the present, cleansed and returned to their proper place, until the time could be given for proper treatment. The wound of the abdominal walls was also simply cleansed with an application of antiseptic dressing, and then strict rest was ordered. The mind of the patient having had no change at all from the beginning of the wound, conversation was as sound as usual; to alleviate the constant and intense pains in the abdomen, morphine was repeatedly injected. There was also a desire to pass urine but without effect; so a catheter was introduced but only blood came out. It was thus evident that the bladder was injured too. At 4 o'clock in the afternoon, that is, eight hours after the wounds, he died of collapse.

174.—**Perforating wound of lumbar region with compound fracture of the right thigh**:—T. Ishikawa, aged 22, a male nurse of the Hiyei, in the battle of the Yellow sea, was assisting in an operation on a wounded man in the surgery on the rear of the lower deck, when a hostile shell of 30.5 c.m. burst against the mizzen mast in that place. He sustained a perforating wound from some of the splinters, passing from the loins to the abdomen and crushing the lumbar verteblæ; and a compound fracture at the middle of the right femur. He died from great hæmorrhage and shock.

175.—**Mutilation of abdominal wall with compound fracture of right thigh**:—K. Yoshioka, aged 26, one of the crew of a torpedo of the Matsushima, in the battle of the Yellow sea, was shot through the abdominal wall by a shell that dashed into the torpedo room, the abdominal wall being so mutilated that the intestines protruded. Besides this, he sustained a compound fracture of the right femur. He was instantly taken to the surgery on the fore part of the upper deck (the surgery on the lower deck had already been destroyed) and was undergoing an operation, when another hostile shell of 30.5 c.m. exploded in the fore part of the lower deck and gave him a severe shock which caused instant death.

176.—**Partial mutilation of abdominal region**:—J. Ogiwara, aged 22, a carpenter of the Takachiho, in the battle of the Yellow sea, was turning the fan for the magazine in the gun-support of the revolving gun in the rear of the lower deck, when a hostile shell exploded in the rear of the starboard side. Some fragments of the shell pierced the ship's side and dashed into the gun-support, mutilating the left side of the abdominal wall. He died on the spot from the shock.

177.—**Mutilation of abdomen**:—C. Ishizuka, aged 26, Chief-Paymaster of the Hiyei, in the battle of the Yellow sea, was, as an assistant to the surgeons, taking the record of the wounded men, seated on a chair in the surgery of the ward-room at the rear of the lower deck, when a 30.5 c.m. hostile shell entered the room piercing through the starboard side of the stern, and burst against the mizzen-mast. One of the large fragments of the shell cut through his body, causing instant death.

178.—C. Murakoshi, aged 30, Assistant Surgeon of the Hiyei, in the battle of the Yellow sea, was attending on a wounded case in the surgery, when a 30.5 c.m. hostile shell exploded in the said room. One of the large fragments of the shell severed his trunk, causing instant death.

179.—M. Kōno, aged 32, one of the torpedo men of the Matsushima, in the battle of the Yellow sea, was at work in the middle torpedo-room, when a hostile shell dashed into the room after piercing through the port side, and shot right through his abdomen, causing instant death.

180.—T. Kitamura, aged 26, a torpedo-man of the Matsushima, in the battle of the Yellow sea, was at work in the middle torpedo-room, when a hostile shell entered the room and killed him outright by cutting him in two at the abdomen.

181.—F. Yubara, aged 26, a torpedo-man of the Itsukushima, in the battle of the Yellow sea, was at work in the fore torpedo-chamber, when a hostile shell exploded against the boom for the torpedo net on the starboard side in the fore part. Some of the fragments crushed through the ship's side into the torpedo-room and mutilated his abdomen. He was killed instantaneously.

182.—I. Nakamura, aged 33, petty officer of the Tenryū, in the course of the attack of Wei-hai-wei on February 11th, 1895, was on the starboard side on the waist of the upper deck, when a hostile shell exploded against the gear of No. 2 port-side gun on the waist of the upper deck. One of the fragments of shell mutilated his trunk from the right epigastric region obliquely to the fork of the thigh, so that the abdominal visceræ protruded. He was killed on the spot.

183.—T. Izawa, aged 28, a seaman of the Tenryu, in the course of the bombardment on the eastern fort of Liukung Island, on February 11th, 1895, was acting as a shell-carrier on the starboard side on the waist of the upper deck, when a hostile shell exploded against the gear of No. 2 port-sidegun on the waist of the upper deck. One of the fragments of shell cut him in two at the epigastric region. He was killed outright.

184.—W. Ōno, aged 22, one of the crew of 12 c.m. gun of the Tenryu, in the course of the attack on the eastern fort of Liukung Island, on February 11th, 1895, was standing on the starboard side on the waist of the upper deck, when a hostile shell burst against the gear of No. 2 port-side gun. One of the fragments of shell mutilated his trunk from the right epigastric region down to the fork of the thigh causing the protrusion of the abdominal visceræ. He was thus despatched outright.

185.—**Compound fracture of pelvis and right thigh** :—S. Mukunoki, aged 22, one of the crew of No. 1 gun of the Akagi, in the engagement of the Yellow sea, was firing No. 1 Q. F. gun on the starboard side on the bridge, when a shell entered by the stern, and burst against the support of the said gun. One of the fragments of shell mutilated the right side of pelvis and cut through the right thigh together with the femoral artery. He died instantaneously from hæmorrhage and shock.

186.—**Mutilation of the lower half of the body** :—T. Tokunaga, aged 25, a torpedo-man of the Matsushima, in the battle of the Yellow sea, was at his duty in the middle torpedo-chamber, when a shell dashed into the room through the port side and struck him, so that the lower half of his body was completely mutilated, causing instant death.

(The corpse of this man was not found for some time, but afterwards the upper half of his body was discovered blown into the store in front of the 32 c.m. gun mounting behind the middle torpedo-chamber.)

187.—T. Miyake, aged 39, Chief-Surgeon of the Hiyei, in the battle of the Yellow sea, was attending to an injured man in the surgery, (the ward-room at the rear of the lower deck); when a 30.5 c.m. hostile shell dashed into the room piercing through the starboard side, and burst against the mizzen-mast. One of the large fragments of shell severed his trunk from the hypogastric region, so that the lower half of the body was crushed to pieces. Thus he was killed outright.

(The lower half of the body of the deceased surgeon was so completely blown to pieces that nothing could be discovered for some time; but afterwards a severed leg was found in a corner of the ward-room, which was judged to be his from the shoe that was on it.)

7.—INJURIES OF THE UPPER EXTREMITY.

(A). INJURIES OF THE SHOULDER.

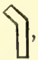
188.—**Simple fracture of the right clavicle** :—J. Haraya, aged 20, a signal man of the Hiyei, in the battle of the Yellow sea, was signalling on the bridge, when an enormous shell of the enemy's exploded in the ward-room at the rear of the lower deck. He was thrown down against the railing of the bridge by the violent shock of the explosion. Thus the right clavicle was broken but as all the surgeons on board the ship had already been killed, he had to have the right arm simply supported by a piece of cloth; until the ship arrived next morning at the rendezvous near Cape Choppeki, when he was attented to by a surgeon from another vessel, and on the 21st, was admitted to the Sasebo Naval Hospital. At the time, the right shoulder was depressed and the movements of the right arm could not be performed. When the arm was forcibly raised, a severe pain was complained of at the outer third of the clavicle, and crepitation was felt on the manipulation of the part; a small ecchymosis also existed in the same locality. The injured limb was fixed by a bandage. On the 30th of the month, he was transferred to the Kure Naval Hospital. By October 10th, the fracture had united. On the 25th, he left the hospital to resume service.

189.—**Compound fracture of right clavicle** :—S. Hirokawa, aged 20 crew of 17 c.m. gun of the Fuso, in the battle of the Yellow sea, was resting by the port side of the funnel-casing, when a hostile shell crushed the lower part of the funnel. From one of the broken pieces of the funnel, he received a blind wound on the outer side of the right clavicle. On examination, the entrance wound was found to be 2 c. m. in vertical diameter, 1.5 c.m. in transverse diameter, 6 c.m. in depth, and running upwards as far as the outer third of the bone, where an irregular square shaped iron piece of 2 c.m. long, 1 c.m. wide, and 3 m. m. thick was found lodged.

This was extracted and the periosteum was found to be stripped off and a part of the bone broken. An antiseptic dressing was applied. On the 21st, the patient was admitted to the Sasebo Naval Hospital. At that time, the wound developed granulation, with a slight suppuration. On October 15th, the granulation entirely covered the surface of the bone, and no probe touched the bone. On the 28th, he was transferred to the Kure Naval Hospital when only a small surface of the size of a thumb tip remained, and this was gradually forming a cicatrix. On November 19 th, he left the hospital completely recovered.

190.—**Contused wound of the left shoulder with crushed wound of the toes**:—K. Matsuzawa, aged 25, Assistant Engineer of the Itsukushima, in the course of the naval engagement of the Yellow sea, on September 17th, 1894, was in the after boiler-room, when a hostile shell exploded against the ladder, after knocking through the middle step of the boiler room and piercing through the coal bunker in the waist on the starboard side. One of the fragments of shell inflicted a contused wound at about 6 c.m. below the spine of the left scapula. It was of an irregular square shape about 5 c.m. in diameter and lacerated in a star-like form, and reached to the scapula, but without fracturing it. Besides, on the inner side of the right great toe, and on the outer side of the left little toe, were found small lacerated wounds. After temporary treatment had been given, he was, on the 21st, admitted to the Sasebo Naval Hospital. At the time, the borders of the shoulder wound, and especially on the inner side of the scapula were swollen ; on examining the wound, a probe passed upward and outward, measuring 4 c.m., and discharged a little pus. The wounds of the toes had already dried. On the 29th, the inflammation around the wound of the shoulder had subsided ; yet the cavity of the wound remained wide, and the granulation was not favourable. Moreover the pus burrowed down forming a cavity ; so a counter opening was made at the part to facilitate the discharge. On October 12th, the temperature suddenly rose to 39°. 8C., and the patient complained of headache, giddiness and thirst. On examining the wound, no remarkable change was found and pus escaped freely without accumulation. A dose of calomel was administered and a wet carbolic compress applied to the wound. On the 14th, the temperature kept at 40° C., and an erysipelatous patch of the size of the palm was found around the wound. Ichthyol was applied, and the use of wet carbolic compress continued. On the 15th, the temperature stood as high as before ; the area of the erysipelatous patch extended in all directions invading the parts over the upper part of the spine of the scapula above; the dorsal vertebræ on the right, the posterior border of the axilla on the left and the lower part of the scapula below. Ichthyol was continuously applied, and a mixture of tincture of perchloride of iron and sulphate of quinine was administered internally. On the 16th, the area of the patch still increased, reaching above to the root of the neck, on the left side, to the nipple line beyond the axillary border. It was, however, subsiding below. The wound was clean and the granulation favourable. The quantity of urine in 24 hours was 400 grammes, containing albumen. On the 18th, the erysipelatous patch extended towards the arm, but in the other directions gradually subsided. After the 20th, the extension of erysipelas ceased; and the quantity of urine increased to 800 grammes. On the 21st, the temperature began to lower: on the 22nd, it fell to normal; and the patch around the wound had almost faded. On the 26th, the erysipelas was completely healed. The wound of the shoulder continued to progress favourably, and the patient recovered on November 14th, and left the hospital to return to duty.

191.—**Gutter wound of the shoulder**:—Y. Nishimura, aged 21, crew of No. 6 Hotchkiss gun of the Akitsushima, in the battle of the Yellow sea, was standing by the No. 6 Hotchkiss gun on the port side on the waist part of the upper deck, when a hostile shell exploded against the shield of No. 5 side-gun on the starboard. One of the fragments of shell inflicted a grooved wound 8 c.m. long and 3 c.m. deep running transversely over the upper part of the spine of right scapula. The margins of the wound were cut sharp, they were sutured together, and the patient was taken on board a vessel bound homeward on the 19th and was admitted to the Sasebo Naval Hospital on the 21st. At this time, the wound had already suppurated, and no hope of the first union was entertained, so the stitches removed and the wet carbolic compress applied. After a time, pus discharged freely, the granulation presented a pale and swollen condition. Iodoform was sprinkled over it and a carbolic gauze applied. By the end of November, the granulation improved; pus discharge stopped, and a cicatrix gradually formed. On December 5th, he was perfectly recovered and left the hospital to return to duty.

192.—**Perforating wound of the right shoulder and arm with contused wound of face**:—S. Tagami, aged 26, crew of No. 7 gun of the Hiyei, in the battle of the Yellow sea, on September 17th, 1894, was firing the No. 7 gun on the starboard side of the quarter-deck, when a hostile shell pierced through the ship's side just behind the port of the said gun, crushing the wooden planks and iron-plating. Some of the iron pieces thus broken, inflicted wounds on the face, right scapula and arm. On examination, there was a lacerated wound of 3 c.m. running laterally above the right eyebrow, and a zigzag shaped lacerated wound, 3 c.m. in length, running obliquely on the right cheek. These were both so shallow that only the skin was injured. Another lacerated wound shaped , and extending for 4 c.m. over the spine of the right scapula, was found reaching down to the surface of the bone, which was fractured in a line running outward from the point just below the spine of scapula. Another lacerated wound also existed on the posterior part on the upper third of the right arm. The wound measured 4.5 c.m.; the entrance was turned out in a remarkable manner exposing the muscles in the shape of a crater. The canal of the wound ran upward and inward for about 12 c.m. and reached to the bone, producing an oblique fracture of the surgical neck of the humerus; the broken ends kept their normal position without being displaced. Probably the iron fragment entered by the shoulder and passed out by the upper arm. An antiseptic dressing was applied, and the upper limb fixed with a splint: the patient was taken on board a transport on the 19th and admitted on the 21st to the Sasebo Naval Hospital. On admission, the wounds of the upper arm and shoulder being cut open, the broken pieces of bone were extracted. After irrigation of the wound with carbolic lotion, a drainage tube was inserted. On the 24th, though the wounds on the face formed union by granulation, the wounds on the arm and shoulder were discharging abundantly; the margins were inflamed, presenting a dark reddish colour; the temperature indicated 38° C. On October 3rd; the marginal inflammation of the wounds of arm and shoulder had disappeared, with diminution of discharge, and the temperature had fallen to normal from the 1st of October. To the right upper limb, a fenestrated plaster of Paris bandage was applied. From that time, the wounds progressed without any striking changes. By the beginning of December, the fracture of the upper arm produced a callus and the canal wound at last became narrower; hence the plaster of Paris bandage wae removed. On January 30th, 1895, a cicatrix formed over the wound of the scapula, while that of the upper arm still retained a sinus which discharged more or less pus. On February 27th, the temperature suddenly rose to 40° C. attended by nausea and eadache. The bandage was removed, and the wound was examined, when a largs quantity of pus escaped from the sinus of the upper arm, yet the granulation was healthy, and no sign of inflammation existed. After irrigation of the sinus with carbolic lotion, a wet carbolic gauze was applied, and 15 gr. of quinine given. The next morning, the high temperature continued with nausea and vomiting. On March 1st, vesicles formed around the wound of the upper arm, and a red patch over the upper part of the spine of scapula, presented characteristic signs of erysipelas. Ichthyol was painted on the part, and strict antiseptic measures were continued for the wound. Internally a mixture of quinine and tincture of perchloride of iron was given ; but the symptoms aggravated notwithstanding, and the erysipelatous patch extending more and more, the right upper arm, neck, and back were congested all over, finally affecting the face above and the buttocks below. The temperature had an irregular fluctuation, the patient became gradually exhausted and at length died from collapse on the 17th of March.

193.—**Perforating wound of the right shoulder, blind wound of right thigh and Abrasion of left leg**:—T. Kashio, aged 18, a stoker of the Itsukushima, at the naval engagement of the Yellow sea, on September 17th, 1894, was in the after boiler-room, when, after breaking through the coal-bunker of the starboard waist, a hostile shell exploded against the ladder set against the middle-step of the said boiler-room. Some of the fragments of shell, inflicted a perforating wound which entered by the outer end of the right clavicle and passed out at the upper part of the spine of the right scapula, and a blind wound just below the Poupart's ligament of the right thigh. The patient was temporarily dressed on board and was admitted to the Sasebo Naval Hospital on the 21st. Examined at the hospital, the entrance wound at the outer end of the clavicle was found to be of an oval shape of the size of a thumb-head, and the exit in the scapular region to be smaller and irregularly torn ; the wounds being probed into, fractures of the spine of scapula and outer end of clavicle were recognized. The wound at the upper part of the right thigh was not large enough to admit the end of the thumb, and taking its course inwards and downwards, it measured 6 c. m. in depth, and a foreign substance was felt at the bottom. Besides, on the inner side of the left leg were found three abrasions, which however had already been dried by the formation of scabs. Under an anæsthetic, the wound over the scapula was cut open, and five broken pieces of bone of some 3 c. m., were extracted from it, while from that of the right thigh, a shell fragment of the size of a thumb-head was extracted (see the illustration No. 6). The wounds were treated antiseptically. On October 28th, the wound at the inguinal

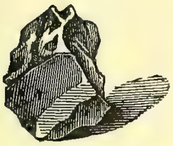


Fig. 6. Fragment of shell extracted from the wound of right thigh.

region healed by cicatrix, and that of the scapula progressed favourably, so the patient was on that day transferred to Kure Naval Hospital. On December 22nd, though the wound of the scapula had healed, yet the movements of the joint were greatly impaired, and in addition, the upper limb on the same side was much emaciated, with an entire loss of grasping power. These defects were not recovered after a lapse of many months, so he was dismissed from service for life on the 10th of April, 1895, and was granted a pension according to the regulations.

(B). WOUNDS OF THE SHOULDER JOINT.

194.—**Contusion of the right shoulder and ankle joints with abrasion of scalp**:—G. Okubora, aged 45, warrant officer of the Matsushima, in the course of the battle of the Yellow sea, on September 17th, 1894, was, in charge of the tackle-mending and of the carriers of the wounded, standing on the fore part of the upper deck, when a 30. 5 c. m. hostile shell burst against the shield of No. 4 port-side gun on the fore part of the lower deck, and, at the same time set on fire a large quantity of powder provided for the side-gun. By the shock of the explosion, the upper deck was rent open and forced up, throwing him about 6 yards backwards. At the time, noticing fire about him, he took a swab and tried to put it out, and for that purpose advanced some three steps in the smoke, when suddenly he fell down upon the lower deck through the gap just made in the upper deck. He sustained a contusion on the right shoulder and the right foot, with a slight abrasion on the head and left ear. At the time, the lower deck was filled with smoke and nothing could be seen, but he managed to creep to a starboard port hole led by a faint light, and getting out through it, climbed along the ship's side upon the upper deck, where he betook himself instantly to the work of extinguishing the fire. When the fire was put out, he was treated on board the vessel. Conditions of the wounds: on the outer side of the right shoulder was a subcutaneous extravasation, (the part becoming of a purple colour) attended by swelling and pains; and over the outer ankle of the right foot another slight subcutaneous extravasation existed, pain being felt on walking. Again on the left parietal region, and on the left ear, were seen abrasions of skin. To the injured parts of the shoulder and foot was applied a lead lotion; and iodoform was sprinkled over those of the head and ear, which were then sealed with adhesive plaster. On the 23rd, the abrasion of the head and ear had accomplished union; on the 30th, the swelling and pain of the shoulder and foot had entirely gone.

(C). INJURIES OF THE ARM.

195.—**Contusion of the right arm**:—K. Kawabata, aged 21, a seaman of the Hiyei, at the naval battle of the Yellow sea, was opening the door of the magazine under the lower deck, when a 30.5 c.m. hostile shell exploded in the ward-room on the lower deck, thus breaking the deck and planks. One of the wooden splinters caused a subcutaneous extravasation of an irregularly oval shape measuring 3 c.m. in diameter on the outer side of the middle part of the right upper arm, attended with an abrasion of skin at its center. A wet carbolic gauze was applied, and the part healed on the 21st of the same month.

196.—**Contusion of the left upper arm**:—H. Kubo, a gunner of the Yoshino, aged 28. In the course of the attack on the eastern forts of Liukung Island, February 7th, 1895, he was firing on the fort of No. 6 side-gun on the larboard, when a hostile shell hit the shield of No. 6 3-pounder on the port side. By one of the broken pieces of that shield, he sustained a contusion on the outer and back part of the left upper arm, where an abrasion of some 6 c.m. square was inflicted with swelling, pain and extravasation underneath, but without any lesion of bone. A wet carbolic gauze was applied and the wound healed on the 17th of the same month.

197.—H. Marubashi, Sub-Lieutenant of the Fusō, aged 27, at the naval engagement of the Yellow sea, September 17th, 1894, was engaged, on the fore-bridge, in surveying the distances of the enemy's vessels, when a hostile shell exploded on the upper deck, the shell-fragments flew up and struck the semaphore signalstand, and one of them struck rebounding, the upper part of his left arm. On examination, an abrasion was found on the front and outer part of the left arm with an extravasation under the skin around the wound. Marked swelling existed over the shoulder and the upper part of the arm, so as to interfere with free movements of the joint, but no injury of bone was found. A wet carbolic gauze was applied over the part and strict rest ordered. On the 18th, the swelling, aggravated extending down to the front part of the left side of the chest. On the 25th, the swelling decreased, and ecchymosis made its appearance on the upper and back part of the shoulder and the back of the upper arm. The abrased surface of the skin presented a purplish-black colour. Gradually, the movements of the injured limb recovered, though an induration persisted in the outer end of the pectoralis major and the front part of the deltoid muscle. As the abrased wound had not yet healed entirely, on October 13th, the patient was sent to Sasebo Naval Hospital. At that time, the wound of the upper arm presented a round superficial granulating surface of 2 c.m. in diameter; its margins being covered with white newly-developed epithelium, and the borders of the wound still remained swollen and indurated. The shoulder joint could be passively moved from the side of the body to a right angle, but it was impossible to keep it in that position. To the surface of the wound boracic ointment was applied, and to the indurated part, spirit of camphor. On the 29th, the abrasion of the skin healed, and the swelling greatly abated, yet the movements of the shoulder joint still resisted free motion. By December 14th, the induration of the part had almost disappeared and the movements of the joint at last returned. So on that day, he left the hospital and returned to duty.

198.—I. Moriyama, aged 28, a seaman of the Saikyo-maru, in the battle of the Yellow sea, was firing the 57 m.m. Q. F. gun at the stern of the upper deck, when a hostile shell exploded against the after most boat-davit on the starboard side. One of the fragments of shell inflicted an abrasion on the outer side of the middle part of the left upper arm. He complained of a slight pain:—carbolic oil and a bandage were applied. On the 19th, the part healed completely.

199.—**Abrasion of the left upper arm with burns of the left hand**:—S. Arai, aged 42, a senior nurse of the Yoshino, in the battle of the Yellow sea, was standing in the surgery of the ward-room, when a hostile shell perforated the starboard nettings on the after part and exploded on the quarter deck, thus breaking the deck; and the fragments of shell fell into the ward-room. One of the fragments inflicted an abrasion 3 c.m. long on the back part of the lower third of his left upper arm, and the flame of the explosion gas gave him a slight burn in the middle of the back of the left hand. An antiseptic bandage was applied; and the parts healed on the 21st.

200.—**Contused wound of the right upper arm**:—Y. Nakashima, aged 27, a seaman of the Tenryu, at the time of the bombardment of the eastern fort of Liukung Island, February 11th, 1895, was hauling up shells for the forward revolving gun by means of a tackle, and standing by No. 2 hatch in the waist of the upper deck, when a hostile shell burst against the No. 2 side gun on the larboard waist of the upper deck. From one of the fragments of shell, he received a contused wound 1 c.m. deep, of the size of a thumb-head, just above the internal condyloid eminence of the right upper arm. The margins of the wound were irregularly lacerated and attended by a slight hæmorrhage. On introducing a probe, it was found that the wound formed a kind of sack, some 3 c.m. deep, running forwards under the skin; the bone was intact and the movement of the injured limb not hindered at all. A sublimate gauze was applied and the patient was removed on board the hospital ship Kobe-maru. Afterwards, the patient had a slight degree of motor and sensory paralysis of the ring and little fingers on the injured side. The wound gradually developed granulation and on the 20th, he was admitted to the Sasebo Naval Hospital. At the time, the granulation of the wound was found to be healthy and developing well; but paralysis of the ulnar nerve prevented the function of the part supplied by that nerve. Antiseptic treatment was continued with suspension of the injured limb with a triangular sling. On March 15th, cicatrix formed on the wound, but the paralysis of the hand had not ceased, and local bathing of the part, together with stimulating liniment, massage, and the internal use of iodide of potassium were ordered. Afterwards, the conditions gradually improved and on April 6th, he left the hospital to return to duty, completely recovered.

201.—**Contused wound of the left upper arm**:—S. Mori, aged 24, Midshipman of the Matsushima, at the time of the attack on Liukung Island, February 2nd, 1895, was on duty in the conning tower, when an enemy's shell passed over the bridge breaking an iron chain on its way. One of the severed rings of the chain flew into the tower and inflicted a contused wound 1 c.m. in diameter and of sub-cutaneous depth in front of the upper part of the left arm; the margins of the wound were irregular and much swollen, the movements of the injured limb were hindered by pain; but no lesion of bone nor joint was found. Corrosive gauze was applied and the injured limb was secured with a triangular bandage. The wound progressed favourably and healed under scales by the 28th of the same month.

202.—**Lacerated wound of the left upper arm with burns of the face, neck and limbs**:—C. Ariki, aged 26, a seaman of the Matsushima, in the course of the engagement of the Yellow sea, September 17th, 1894, was passing the fore part of the lower deck, when a hostile 30.5 c.m. shell exploded on the same deck, igniting at the same time the ammunition provided for the use of the side guns.

He sustained burns of the 2nd degree on the face, ears, neck, left arm down to the fingers, right forearm down to the fingers and on both legs ; moreover, a fragment of shell inflicted a lacerated wound, 6 c.m. in length, on the posterior part of the left upper arm. Temporary treatment was given on board the ship, and, on the 20th, he was admitted to Sasebo Naval Hospital. At the time the face was all covered with black scabs and the surfaces of the upper and lower limbs were denuded of epidermis, thus exposing the dermis and causing extreme pain. The lacerated wound of the left upper arm was located on the back part, 3 c.m. above the elbow joint, and had lacerated the greater part of the triceps. The wound was gaping and suppurating. It was antiseptically managed and the left upper arm was kept in an extended position. By October 3rd, the burns all healed by renovating epithelium except on the left ear ; and the wound of the left upper arm developed healthy granulation and the pus discharge ceased. On November 6th, the wound of the upper arm formed cicatrices, and the ulcerated surface of the left ear healed by scabbing. The elbow joint gave pain, when forcibly flexed so that its free movement was slightly hindered. Local bathing and active movement of the injured part were ordered, till the joint was at last restored to free movements, and the grasping power of the hand recovered. On February 21st, 1895, he returned to duty.

203.—**Gutter wound of the right upper arm** :—H. Sasaki, aged 35, Lieutenant of the Akagi, in the engagement of the Yellow sea, was standing on the bridge engaged in measuring the positions of the hostile ships, when a fragment of exploded shell came on the bridge from the fore part of the starboard side, and hit him on the right upper arm, so that he lay down fainting for a while, but soon came to himself. On examination, a lacerated wound, 4 c.m. in length, 1.5 c.m. in width and 1.2 c.m. in depth, was found running from the outer side towards the inner and lower part on the lower third of the right arm. The margins were irregularly lacerated but as there was no injury to blood vessels, hæmorrhage was not profuse ; there was no lesion of bone. Under antiseptic precautions, the wound was sutured together, a drainage tube introduced, iodoform sprinkled and a corrosive gauze applied. By the 23rd of the same month, the outer half of the wound had healed, but the inner half suppurated, so the sutures were removed. The granulation of the wound was unhealthy, presenting a grayish-colour, and discharging an offensive thin pus. Lotion of permanganate of potash was tried, with iodoform dusting, and wet carbolic compress, after which the granulation improved, and the pus discharge gradually lessened. By October 18th, the wound had healed by the formation of a slender cicatrix.

204.—**Blind wound of right upper arm with burns of face and arm** :— S. Furuta, aged 24, a magazine-man on the Matsushima at the naval engagement of the Yellow sea, was hauling up shells in the fore magazine, when a 30.5 c.m. shell from the enemy struck the shield of No. 4 side gun in the fore part of the lower deck. One of the flying fragments of shell inflicted a blind wound on the outer side of the middle of the right upper arm. The inlet of the wound measured 2 c.m. in diameter and 6 c.m. in depth, the passage taking an upward and outward course through the soft tissues. At the same time the ammunition provided for the side-guns on the lower deck was set on fire, and he received burns from the flame of the explosion of 1st degree almost all over the face, and of 2nd degree on the outer side of the left upper arm. All the injuries were antiseptically treated and the patient, on the 20th, was conveyed to Sasebo Naval Hospital. In the hospital, wet boracic gauze was applied to the burns, and a counter opening was made to the blind wound on the right upper arm, a drainage tube was introduced and carbolic gauze applied. On October 7th, the burns had completely healed and on December 17th, the wound of the arm was cured ; so he returned to duty.

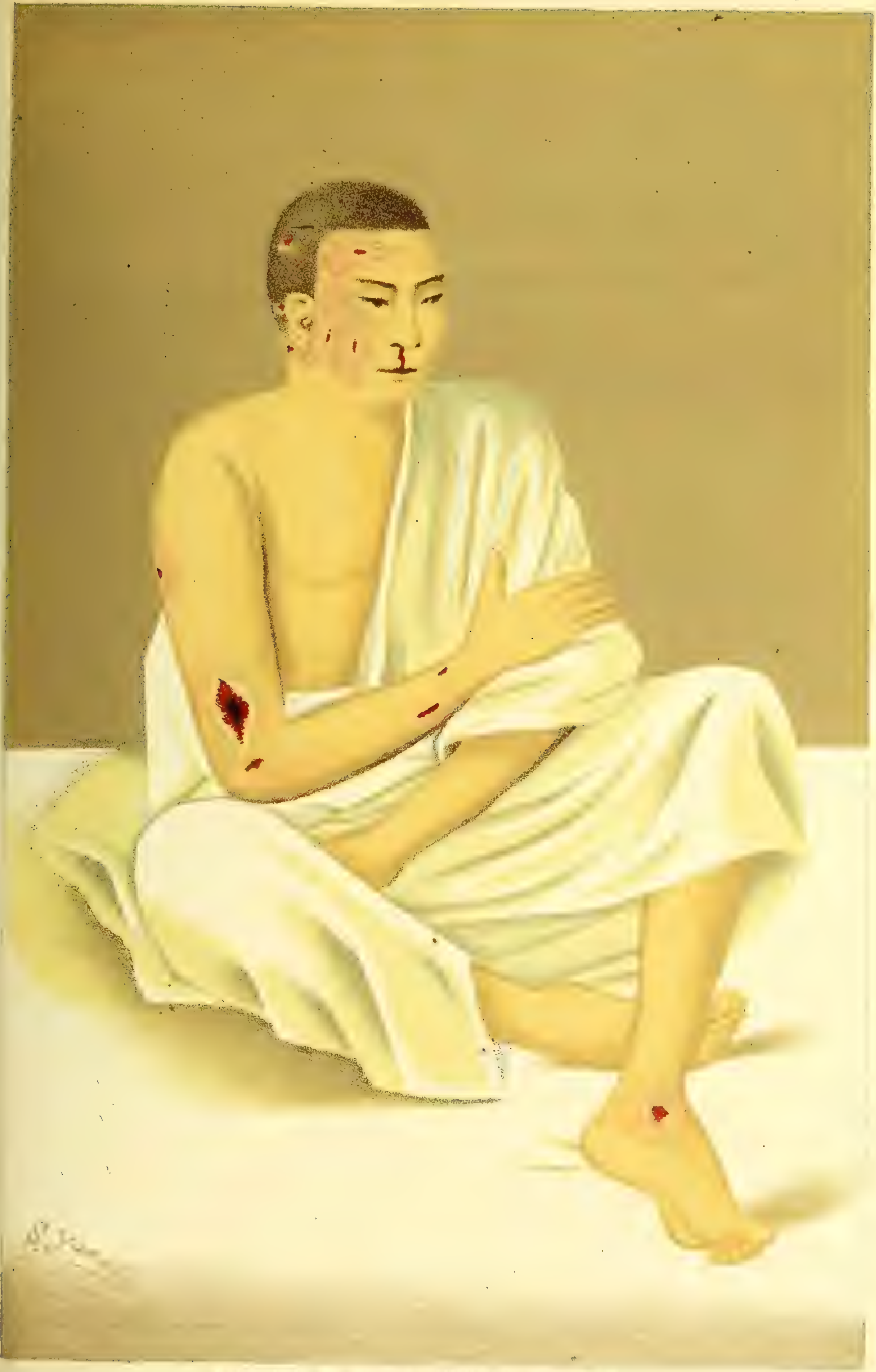
205.—**Blind wound of left upper arm** :—J. Harano, aged 21, stoker of the Itsukushima at the Naval engagement of the Yellow sea, was standing, as one of the fire brigade on the uppermost grating in the fore engine-room on the upper deck, when a hostile shell exploded after penetrating the fore larboard netting. From one of the shell-fragments, he received a blind wound of the soft tissues in the front part of the upper third of the left arm. The inlet of the lacerated wound was 2 c.m. in diameter, and located at the inner margin of the deltoid; it was 4 c.m. deep reaching to the humerus but without injuring the periosteum or bone. After temporary treatment on board the ship, the patient was, on the 21st, admitted to the Sasebo Naval Hospital. At that time, the wound was found to be clean with very slight discharge of pus and an antiseptic bandage was applied. On the 30th, he was transferred to the Kure Naval Hospstal. Afterwards the case progressed favourably and the surface of the wound cicatrized on the 14th October. However, as the injured limb could not be raised above the level of the shoulder and at the same time the grasping power was impaired, active movements of the limb and stimulating liniment were ordered. Thus free movement was gradually restored, and on November 5th, he returned to duty.

206.—**Contused wound of the left upper arm with partial fracture of humerus**:—Y. Koike, aged 27, Assistant Paymaster of the Tsukushi, at the time of the bombardment of Zhih Island, February 3rd, 1895, was engaged in recording the state of engagement, under the bridge on the larboard side of the upper deck, when a hostile shell came in from the port side and pierced through the lower part of the funnel. One of the broken pieces of the funnel inflicted a contused wound 2 c.m. in length, on the outer side of the lower end of the left upper arm, 5 c.m. above the elbow joint. The skin and muscles of the part were lacerated and the bone was slightly depressed. The passage of the wound ran upward and backward 4 c.m. along the surface of the bone forming a sinuous wound, which was attended with bleeding. Within the wound no foreign substance was found. Corrosive gauze was applied. On the 7th, the torn flaps of the wound presented a grayish colour and suppurated a little. On the 15th, the sloughs were separated and the surface became clean and the granulation was healthy. By the 22nd, the wound became narrow and pus discharge ceased. Boracic ointment and a bandage were substituted. The case was completely cured on the 28th.

207.—**Partial fracture of right humerus with glancing wounds of the head, face, limbs &c.**:—M. Nagatomo, aged 19, a seaman of the Akitsushima, in the naval engagement of the Yellow sea, was carrying shells to No. 5 side-gun, when a well-directed shell hit the shield of that gun and burst. Some of the shell fragments inflicted several wounds on the head, face, and upper and lower extremities. On examination, three abrased wounds were found on the right parietal and occipital regions, one over the right frontal eminence and two on the right cheek; each varying in size from that of a pea to the tip of the thumb; on the median raphœ of the upper lip a vertical lacerated wound was seen; and the right half of the face was burned, grains of powder still remaining in numberless spots. On the outer side of the lower part of the right upper arm there was an oval lacerated wound, 5 c.m. in length and 3 c.m. in breadth, which reached the bone denuding the periosteum of the humerus and breaking the walls of the shaft, which, however, was found to be not entirely broken. Also on the back of the upper part of the right arm a contused wound, and three on the outer side of the right forearm were found, which were, however, all superficial, not reaching beyond the subcutaneous areolar tissues. Moreover, in the inner side of the left foot another abrased wound of the size of a 1 *sen* copper coin was found. All the wounds having been antiseptically treated, the patient was conveyed to the Sasebo

Naval Hospital by a transport setting sail on the 19th. At the time of admission, the right upper arm was considerably swollen, and the wound of the lower part of the arm was suppurating. All the other wounds presented favourable conditions. The wound above the right elbow was scraped with a sharp spoon and the free pieces of bone extracted. The arm was dressed with wet carbolic gauze; other wounds were sealed with dry corrosive gauze. Burns of the face were of the first degree, though some parts were of the second degree and sterilized olive oil was painted on them. On October 1st, the abrased wounds and burns on the head and face dried up. Wounds of the upper lip, upper arm, forearm, and on the foot, became smaller, and the pus discharge nearly ceased. The lacerated wound above the right elbow gradually threw out healthy granulation and the swelling of the arm subsided. By the 11th of the same month, the abrased wounds of the several parts had all healed, except the lacerated one above the elbow, which, however, had now grown shallow and small by the gradual development of granulation, still there was a discharge of pus from it and on being probed the bone was reached; but the progress was favourable and by the 24th of November, it was completely healed. But the right elbow joint ankylosed in the position of 90 degrees; and it could not be extended, even with forcible efforts, beyond 95 degrees. By local hot bath, and active and passive movements, the joint was gradually extended to 140 degrees. But the movement could not be perfectly restored, and he was discharged from duty for life on March 16th, 1895 and left the hospital. He was granted a pension according to the regulations. (See illustration.)

208.—**Blind wounds of the right arm with lesion of the bones**:—K. Wakikawa, aged 20, a servant to the Captain of the Hiyei, in the course of the naval engagement of the Yellow sea, was working at the pump of the ventilator in the 3rd quarter of the lower deck, when an enormous shell of the enemy exploded in the ward-room in the 5th quarter. One of the shell fragments inflicted blind wounds on the right upper and fore-arm. As all the medical staff in the ship were killed by this same shell, the wounds had to be dressed for temporary relief by his mates, and it was not until the ship arrived at the station near Cape Choppeki next morning, that he could be properly treated by a surgeon from another ship. Condition of the wounds:—In front of the upper part of the right arm an irregular lacerated wound 2.5 c.m. in diameter and 6 c.m. in depth was found, which took an upward course towards the inner and lower part of the surgical neck of the humerus; by digital



[illegible] SEAMAN [illegible]

WOUND OF [illegible] THE [illegible] WITH FRACTURE OF THE [illegible] AND SEVERAL WOUNDS OF OTHER PARTS

examination a shell-fragment was recognized inserted in the bone, which was extracted. Also on the back of the lower fourth of the right fore-arm, a lacerated wound as large as the tip of the thumb was seen ; the passage of the wound ran upwards to the depth of 3 c.m. reaching to the radius which was fractured. The wounds were dressed antiseptically, and the patient was conveyed to the Sasebo Naval Hospital on the 21st of the same month on board the transport Genkai-maru. Both wounds continued to discharge pus mixed with pieces of broken bone ; so on October 1st, under the influence of an anæsthetic the inlets of the wounds were cut open and examined. The shaft of the humerus just below the surgical neck was found to be severed so as to reach the medullary canal, but without complete fracture, also, at the bottom of the wound of the fore-arm, a small shell-fragment (as shown in figure 7) was found and a fissured fracture of the radius. The fragment of shell in the forearm and the pieces of broken bone were extracted ; then the wound was dressed antiseptically and a drainage tube introduced to the wound of the arm. After the operation there was a slight rise in the temperature, but in two or three days it returned to normal again ; the pus discharge gradually subsided and healthy granulation developed. By the 5th of November, the wound of the fore-arm had healed, leaving no derangement of the movements of the radius. The wound of the upper arm still discharged pus and on probing a coarse surface of bone was felt. By the middle of December, the pus discharge had greatly diminished so that the dressings had to be changed only every three days. Shortly after, the surface of bone became completely covered by callus and the coarse surface of bone could no longer be felt. The drainage-tube was removed and by March 6th, 1895, the wound of the upper arm formed a depressed cicatrix without leaving any marked derangement of the movements of the limb, so the patient left the hospital and returned to duty.

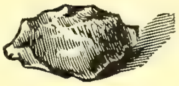
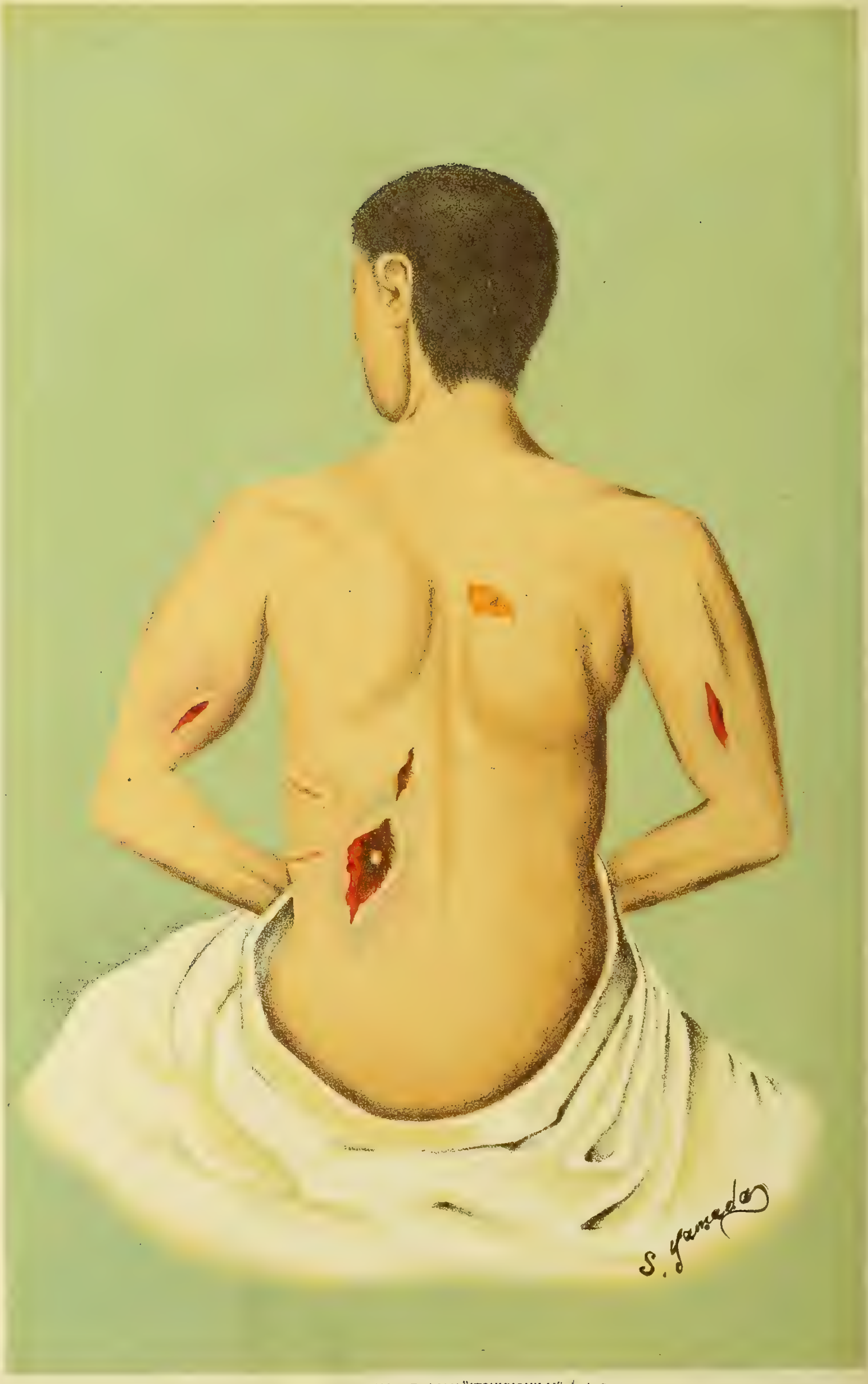


Fig. 7 Fragment of shell extracted from the wound of right forearm.

209.—**Penetrating wounds of both humeri with perforating wound of chest and blind wound of the back &c :**—M. Fujii, aged 28, a seaman of the Itsukushima, in the naval battle of the Yellow sea, was passing behind the bow gun on the upper deck, when a hostile shell exploded after coming through the port netting. Some of the flying shell-framents inflicted a large wound 15 c.m. in length and 5 c.m. in diameter on the left side of the back at the 10th rib. The rib was broken, the chest wall pierced and the lung perforated so as to let air mixed with blood escape, from the wound producing emphysema under the skin. Besides this the following wounds were found :—Above and inside of this wound was an abrased wound in an oblique line, above and outside two similar ones, a contused wound at the inner margin of the right scapula, and six smaller contused wounds on the outer side of the right thigh. Moreover, the right upper arm at the middle third and the left at the lower third were pierced from the back to the front. The humeri were both fractured, but the brachial arteries escaped injury and bleeding was not great. Antiseptic treatment was immediately given to all the wounds and splints applied to the arms. The patient was removed on thé 19th on board a vessel bound for home and admitted to the Sasebo Naval Hospital on the 21st. At the time, the wounds were inflamed, discharged pus, and on the left side of the chest subcutaneous emphysema existed. On examination, both humeri were found to be broken through transversely, small pieces of bone sticking into the surrounding muscles and the wound canals formed hollow cavities. The rib was broken obliquely, and its inner end penetrated into the wound. The pointed end was sawed away to make it smooth, the free pieces of the broken humeri extracted, drainage tubes introduced, perforated plaster bandages applied, and the wounds irrigated every day. In due course of time, the abrased wounds on the back and right thigh healed, but the penetrating wound of the chest still caused trouble. By October 1st, the subcutaneous emphysema of the chest had extended down to the hypogastric region and even to the scrotum, so tight bandages were applied. On the seventh, a swelling, the size of a bean, was discovered on the right inter-scapular region, and on feeling it a solid body was found to move under the skin. It was cut open and an irregular fragment of shell was obtained. By the 15th, the chest wound had developed granulation, the perforation of the thoracic cavity was perfectly closed so that the air did no longer escape from the lung and the subcutaneous emphysema had almost disappeared. The wounds of both upper arms still had a copious discharge, but minute pieces of bone, like grains, clogged the canals of the wounds obstructed the flow of pus, and consequently the temperature was increased, so the wounds were enlarged to give a free discharge. On November 12th, the chest wounds formed a cicatrix, but the wounds of the upper arms were still troublesome. By March 28th, 1895, the fractures of both arms had united, and the wound of the left arm healed, but that of the right still discharged pus slightly, with occasionally minute pieces of bone. The derangement of the right musculo-spiral nerve and its branches caused drop-wrist and anæsthesia of the parts which it sup-



M. FUJII. LEADING SEAMAN "ITSUKUSHIMA". I. J. S.

PERFORATING WOUND OF BOTH UPPER ARMS WITH FRACTURE OF HUMERUS ANDPENETRATING WOUND OF THE LEFT THOROX WITH FRACTURE OF RIB.

plied, and the grasping power of the right hand was entirely lost. On May 3rd, the patient was transferred to the Kure Naval Hospital. The granulation of the wound continued to develope gradually, and the discharge of pus ceased. By October 22nd, the wound had entirely healed, but the paralysis of the right musculo-spiral nerve remained as before, and the grasping power was no more than 5 k.g. The patient was therefore adjudged unfit for service, so on December 20th, he was invalided for life and left the hospital. He was pensioned according to the regulations. (See illustration.)

(D). INJURIES OF THE ELBOW JOINT.

210.—**Contusion of the right elbow joint**:—H. Kadotani, aged 23, a seaman belonging to the Tenryu, in the course of the attack on the eastern fort of Liukung Island, was working as a shell-carrier, in the after cock-pit, when a well-directed shell burst against the No. 2 gun on the larboard side of the upper deck, and broke the brass railing of the 3rd hatch, one of the broken pieces of the bar fell on his right elbow causing a subcutaneous extravasation of blood in the extensor side of the joint, which gave rise to pain on flexion. The joint was kept at a suitable position and dressed with a carbolic lotion. By the 17th, the swelling as well as the pain had greatly decreased, and the movement of the elbow was almost restored. Tincture of iodine and a tight bandage was applied and by the 22nd, the lesion had entirely healed.

211.—**Contusion of the right elbow joint and contused wound of the left leg**:—C. Sasaoka, aged 25, Sub-Lieutenant of the Matsushima, in the engagement of the Yellow sea, was officer commanding the fire brigade on the lower deck, when a 30.5 c.m. hostile shell exploded striking the shield of the larboard No. 4 side-gun on the fore part of the lower-deck. This caused all the shells and powder provided for the side-guns to explode at once, and by the shock he was thrown back and sustained blows on the back part of the parietal region, the right shoulder, and the right elbow joint; besides, by one of the broken pieces of the ship's planks, he received a contused wound in front of the middle of the left leg. At the moment of injury, he lost consciousness, but soon came to, and betook himself to putting the fire out; and when it was extinguished, he received treatment on board the ship. The contusions of the head and shoulder were slight, so the swelling and pain disappeared in a few days. But the swelling and pain of the right elbow joint became aggravated, and the wound of the left leg did not heal, so the patient was admitted to the Sasebo Naval Hospital on the 23rd of the month. At the time, the outer side of he right elbow joint presented a purplish blue colour, and the joint was swollen all around, so that its movements were attended by pain, but no injury of either bone could be found. Again, in front of the middle part of the left leg a superficial granulating wound, 3 c.m. long and 2 c.m. wide, was present, which did not affect either the periosteum nor the bone. The right elbow joint was dressed with acetate of lead lotion, and the wound of the leg with a carbolic gauze. On the 29th the contused wound of the leg formed a cicatrix, and the inflammation of the elbow joint gradually subsided, so that it could now be freely moved. On the 30th, the patient left the hospital to resume service.

(E). INJURIES OF THE FORE-ARM.

212.—**Glancing wound of the right fore-arm**:—O. Kosono, aged 29, a seaman of the Yoshino, in the course of the engagement of the Yellow sea, was standing by the side of the 12 c.m. gun on the larboard side of the quarter deck, when a hostile shell came through the starboard netting and struck the shells of 12 c.m. guns placed in rows along both gunwales, causing them to explode. One of the shell-fragments inflicted an abrased wound 1.5 c.m. long on the back part of the upper third of the right fore-arm. A corrosive gauze was applied and on the 21st it healed by scabbing.

213.—**Contused wound of both fore-arms**:—Y. Fukagawa, aged 24, a seaman on the Saikyo-maru, in the battle of the Yellow sea, was firing on the fort with the 57 m.m. Q.F. gun, at the stern of the upper deck, when a shell of the enemy hit the aftermost starboard boat-davit and exploded. Some of the shell-fragments inflicted a contused wound 1 c.m. long and 6 m.m. deep on the back part at the middle of the right fore-arm, and another one of 6 m.m. long and 3 m.m. deep on the radial side of the lower end of the left fore-arm. The margins of the wounds were lacerated and attended by slight hæmorrhage. Within them no foreign bodies were found. Iodoform and carbolic gauze were applied and in due course the surfaces of the wounds developed granulation, and the lesion on the left fore-arm healed by October 11th, but that of the right fore-arm produced a burrowing of pus beneath the margins of the wound and granulation was dull, so the wound was cut open, the unhealthy granulation scraped off, and carbolic gauze applied. Then the granulation steadily improved, the pus discharge decreased, and on November 3rd, it had healed by cicatrix.

214.—**Contused wound of the right fore-arm** :—M. Kawamura, aged 24, a guncrew on the Katsuragi, in the course of the bombardment of the eastern fort of Liukung Island, sustained a contused wound on the back part of the upper third of right fore-arm by one of the splinters of wood caused by the breaking of the ship's planks by a hostile shell. In the course of a few days the wound suppurated, and the temperature rose to 38°. 1 C., so the dressing was changed daily, and in a few days more, the temperature became normal, the inflammation around the wound subsided and on March 18th, cicatrix formed.

215.—T. Takata, aged 21, a guncrew of the Katsuragi, in the course of the bombardment of the eastern forts of Liukung Island, had just rotated the fore-revolving gun, when, owing to the shock caused by a hostile shell knocking the barrel of the gun, he was thrown down, and at the same moment he was struck by a wooden splinter and sustained a shallow wound on the back of the upper part of the right fore-arm. Besides, he complained of pain on the right side of the chest in breathing, where he had received a blow when thrown down, but no physical signs were found on examination. A corrosive gauze, to the wound was applied and the patient ordered to rest. On the 21st, the wound had completely healed forming union under a scab.

216.—**Contused wound of the right fore-arm and contusion of the face** :—S. Hamanishi, aged 24, a seaman of the Yoshino, in the attack of the eastern forts of Liukung Island, was standing on the fort of No. 6 3-pounder above the port netting on the quarter deck, when a shell hit the shield of that gun, and some of the broken pieces of the shield, inflicted a contused wound on the face and another on the right fore-arm. On examination, the left cheek and the tip of the nose had their skin abrased and swollen, the left eye-lids were strikingly swollen and the conjunction congested. Besides this on the inner side of the lower third of the right fore-arm, there was a contused wound some 2.5 c.m. in length, which had irregularly lacerated margins and reached the sub-cutaneous tissue. An antiseptic bandage was applied, and next day the patient was removed to the hospital ship Kobe-maru. The abrased surfaces of the face gradually healed, the swelling of the eye lids subsiding at the same time. The wound of the fore-arm presented no signs either of suppuration or inflammation. The face was protected with a bandage and the fore-arm dressed with corrosive gauze. On the 11th, the patient was admitted to the Sasebo Naval Hospital. The injuries of the face healed before long, and that of the fore-arm developed favorable granulation with gradual formation of epithelium. On the 27th of the same month, the patient left the hospital completely cured.

217.—**Contused wound of the left fore-arm**:—M. Tajima, aged 26, a seaman on board the Hiyei, in the course of the engagement of the Yellow sea, was working with the elevator of No. 9 gun in the stern, when a shell broke through the stern port to starboard. One of the flying wooden splinters caused a contused wound 18 c.m. long and 5 c.m. wide, running downward and outward from the elbow along the back of the upper third of the left fore-arm, and changing its direction in its course to downward and inward. The margins of the wound were lacerated but the skin only was pierced. An antiseptic bandage was applied, the wound progressed favourably and on October 6th perfectly healed by forming a cicatrix.

218.—**Gutter wound of the right fore-arm**:—S. Tanaka, aged 34, chief gunner of the Hiyei, in the course of the naval fight of the Yellow sea, in order to get ammunition, was passing in front of the gun-room in the 4th quarter on the lower deck, when an enormous shell of the enemy exploded in the ward-room of the 5th quarter and caused a wound on the right fore-arm by one of the shell-fragments. As all the medical staff on board were killed at the time, he had to be only temporarily dressed by a shipmate, and was properly treated by one of the surgeons from another ship, when she arrived at the station near Cape Choppeki next morning. Condition of the wound:—On the ulnar side at the upper third of the right fore-arm was found an oblong grooved wound 3 c.m. in length and 1.5 c.m. in width running obliquely. The bottom of the wound reached beneath the skin, but without giving any injury to the muscles or bones. An antiseptic dressing was applied, and by October 7th, the granulating surface of the wound had grown new epithelium from the borders, zinc ointment was applied, and by the 24th the wound was perfectly healed.

219.—**Gutter wound of the left fore-arm**:—Y. Wakinaga, aged 25, one of the torpedo crew belonging to the Matsushima, in the engagement of the Yellow sea, was on duty in the middle torpedo-chamber on the starboard side, when a 30.5 c.m. hostile shell exploded in the fore part of the lower deck and one of the shell-fragments breaking into the said chamber through the bulkhead inflicted a grooved wound 6 c.m. long, 4 c.m. wide and 1. 5 c. m. deep, running laterally from the radial side to the ulnar on the back part of the lower fourth of the left fore-arm. Temporary dressing being applied on board, the patient was transferred to the Sasebo Naval Hospital on the 20th. At the time, the margins of the wound were everted presenting a shape like a flower, and of a dark purplish colour with sloughs at several spots; the granulation at the bottom was unfavourable. Iodoform was sprinkled on and a wet carbolic dressing applied. On the 29th, burrows, each some 6 c.m. long were produced beneath the skin, one above and one below the wound, and as the escape of pus was obstructed they were cut open on October 5th, the pus discharge decreased, and granulation improved. By January 12th, 1895, the wound had completely cicatrized. The movement of the injured limb, was not interfered with, but the grasping power was somewhat diminished. A protecting bandage was applied, and frequent active movements of the limb were ordered. On February 9th, he left the hospital and returned to duty.

220.—**Non-perforated wound of the right fore-arm:**—O. Okamura, aged 24, a guncrew of the Akagi, in the course of the battle of the Yellow sea, was by the side of No. 3 12 c. m. gun in the waist of the upper deck where he was engaged in firing, when a fragment of a broken shell came flying in from the starboard side and inflicted a wound on the right fore-arm. On examination, on the inner side of the middle of the right fore-arm a lacerated wound 2 c. m. in diameter was found; the margins were irregularly torn attended by bleeding and pain. When probed, the wound measured 5 c. m. running in a downward direction, and a foreign body was discovered, so the wound was incised and a shell fragment (see the figure 8.) was extracted by a pair of bullet forceps; on further search in the wound along the inner border of the ulna, the periosteum was found to be stripped off. The blood vessels were ligatured and an antiseptic dressing applied. On 18th, the margins of the wound became slightly swollen; but treatment was continued as before. The patient was taken on board the transport on the 19th, and conveyed to the Sasebo Naval Hospital on the 21st. As there was a tendency to accumulation of pus in the wound a counter opening was made below the wound canal of the fore-arm, a drainage tube introduced and an antiseptic dressing applied. On the 28th the granulation in the canal protruded from the wound orifice presenting a pale appearance, it was rubbed over with nitrate of silver and an iodoform dressing applied. On October 6th, the pus discharge from the wound decreased considerably, the

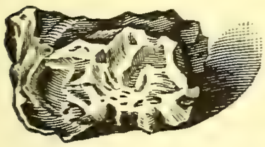


Fig. 8. Fragment of shell extracted from the bottom of the wound of the forearm.

swelling around the wound disappeared and the granulation grew bright red so that every condition was now auspicious. On the 28th, the patient was transferred to the Kure Naval Hospital. On November 25th, the wound formed a cicatrix, but owing to the cicatricial adhesion of the deep flexors, free movements of the ring and little fingers were hindered. Local warm bathing, massage and active as well as passive motions of the said fingers were perseveringly performed and by December 23rd, the movements of the fingers had greatly improved, so that the flexion of these fingers was only slightly hindered. On that day, the recovered patient left the hospital to return to duty.

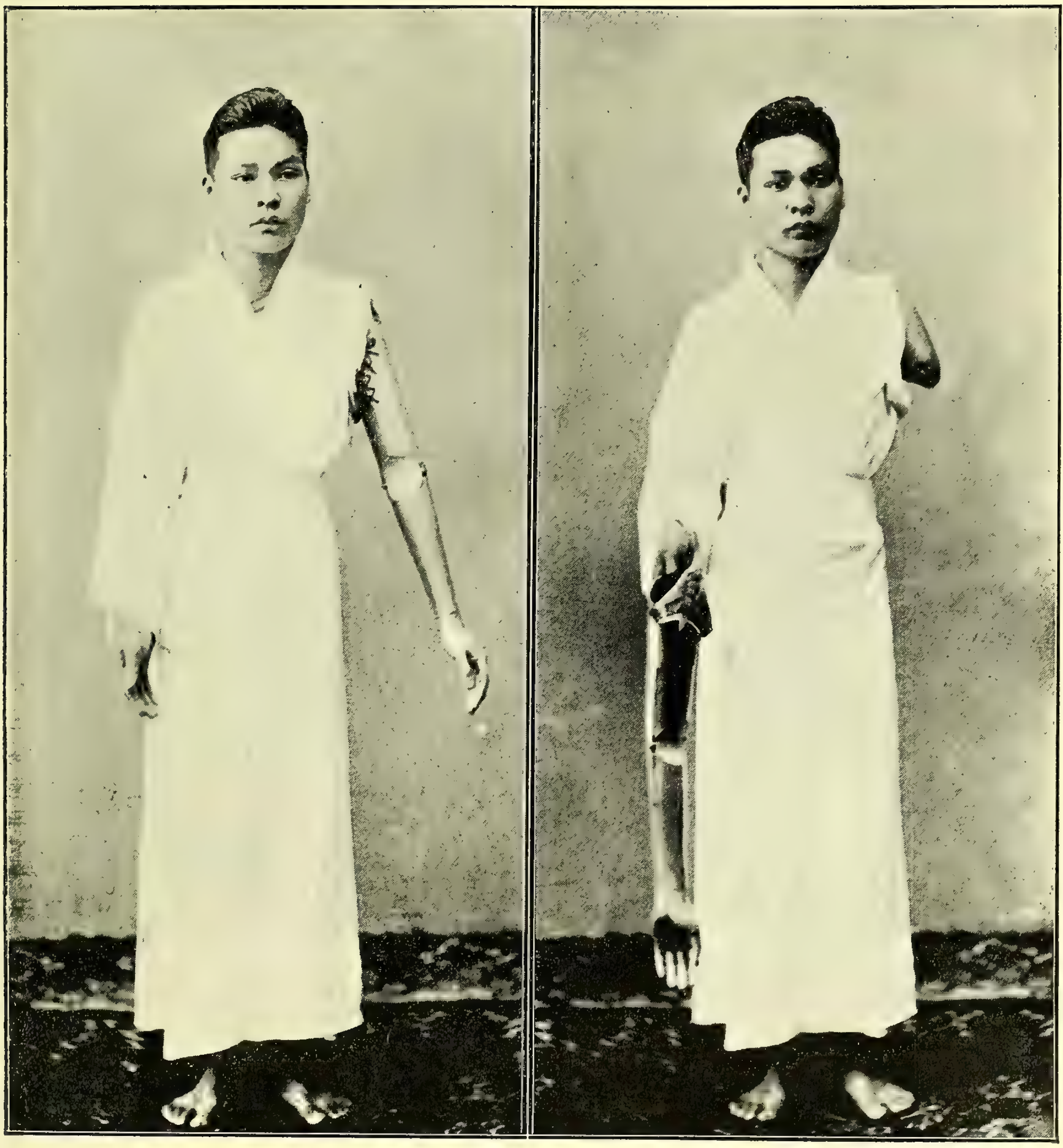
221.—**Non-perforated wound of the right fore-arm and contused wound of the fingers**:—S. Suge, aged 30, a petty officer of the Hiyei, in the naval engagement of the Yellow sea, was at the wheel on the quarter deck, when an enormous shell of the enemy exploded in the ward room at the stern of the lower deck. The shell fragments, broken pieces of plank and furniture flew out of the sky light of that room, and some of them inflicted a blind wound on the back part of the middle of the right fore-arm, and contused wounds on the right index and middle fingers. This enormous shell also killed all the medical staff on board, and the patient had to be temporarily dressed by a shipmate, and was properly treated by a surgeon from another ship, when the vessel arrived at the station near Cape Choppeki next morning. On the 26th of the same month, he was admitted to the Sasebo Naval Hospital. Conditions of the wounds:—On the back part at the middle of the right fore-arm was a lacerated wound 3 c. m. in diameter, and 3 c. m. in depth running in an upward direction. The margins of the wound were slightly swollen, with a discharge of pus and foreign bodies were found at the bottom, which, being extracted, proved to be five or six pieces of buck-wheat husk. At the root of the right index and middle fingers small contused wounds were found which were, however, already healed. An antiseptic dressing was applied, to the wound of the fore-arm. On the 30th following, the patient was transferred to the Kure Naval Hospital, where more pieces of buck-wheat husk were taken out of the wound. On November 6th, he left the hospital completely recovered and returned to duty.

222.—**Perforated wound of the left fore-arm, glancing wound of the left leg and burns of face**:—H. Nakata, aged 23, a stoker on board the Matsushima, in the fight of the Yellow sea, was on duty in the engine room, when a hostile shell exploded in the neighbourhood of the after-engine room and broke the wall plate at the entrance of the room. Some of the iron fragments inflicted a perforating wound of the right fore-arm and an abrased wound of the left leg, and burns on the right side of the face by explosion gas. Relieving measures were taken temporarily, and the patient was admitted to the Sasebo Naval Hospital on the 20th following. On examination, on the outer side of the left fore-arm at a point 3 c. m. below the elbow joint, two orifices were found communicating beneath the skin. A probe reached the radius, but no lesion of bone nor existence of foreign body was discovered. The margins of the wound were somewhat swollen presenting a purplish colour. On the outer side of the middle of the left leg were found an abrasion, and a burn of the second degree on the right side of the face. Corrosive gauze was applied to the wounds, and to the burns wet boracic dressing. By October 13th, the burns of the face and the abrasion of the leg had healed. But the wound orifices of the left fore-arm contracted and led to an accumulation of pus, so an incision was made. Consequently, pus was discharged freely, and favourable granulation developed. On December 7th, cicatrices formed, but the adhesion of muscles to the bone prevented rotation and pronation of the fore-arm. Local bathing and active movements were encouraged, and on the 19th following, though the movements of the injured limb were not completely restored, yet being adjudged able for service, he was ordered to return to duty.

223.—**Fracture of the right ulna and the first phalanx of the right ring finger**:—F. Nagasaka, aged 23, one of the crew of the No. 7 gun of the Hiyei, in the engagement of the Yellow sea, was firing from the fort of the gun on the starboard quarter deck, when a hostile shell came through the ship's side just behind the gun. The flying wooden splinters inflicted fractures of the right ulna and ring finger. Temporary relief was given on board, and the patient was admitted to the Sasebo Naval Hospital on the 21st of the same month. Conditions of the wounds :—The right fore-arm was much swollen, especially below the middle part, and at the junction of the middle and lower third of the ulna crepitation was felt. Besides, on the back of the first phalangeal joints of the right ring and little fingers, as well as on the upper arm small contused wounds were found. There was also a fracture of the first phalanx of the ring finger. The fore-arm was encased with plaster of Paris bandage. On the 30th following, the contused wounds on the right arm and index finger healed. The swelling of the fore-arm subsiding the plaster bandage became loose, so it was replaced by a splint. The same day the patient was transferred to the Kure Naval

Hospital, and by the middle of October, the fracture of the ulna and ring-finger was completely united, but as the extension and flexion of the ring and little fingers were greatly interfered with, the grasping power was strikingly decreased and with the right hand heavy things could not be lifted. By the diligent repetition of active movements, the recovery of the injured limb was sought for, but as it was almost hopelessly delayed in recovery, the patient was, on February 9th, 1895, invalided for life, and pensioned according to the regulations.

224.—**Compound fracture of the left fore-arm with blind wound of the upper arm**:—K. Funakoshi, aged 20, a stoker on board the Itsukushima, in the naval engagement of the Yellow sea, was working in the after boiler-room, when a hostile shell came through the starboard coal-bunker amidships and exploded against the ladder set against the middle step in the after boiler-room. Some of the shell-fragments wounded him on the left upper and fore-arm. The wound of the upper arm was a lacerated one, of the size of the tip of the thumb, located at the junction of the upper and middle third of the antero-external side, it reached to the bone but without any injury to it. That of the fore-arm was an oval shaped lacerated wound 3 c. m. in diameter at a point 6 c. m. below the elbow joint and a little behind the ulnar side. The wound ran in an upward and outward direction and a shell-fragment remained at the bottom. The upper part of the ulna was broken, and the brachial artery rent at the bifurcation, so that the pulsations of the radial and ulnar arteries ceased, but hæmorrhage was not profuse, and the radius escaped injury. Besides, in the middle of the extensor surface of the left fore-arm, and below a small abrased wound was found. The wounds were dressed with corrosive gauze. On the 21st of the same month, the patient was admitted to the Sasebo Naval Hospital. At the time, the injured limb presented a purplish blue colour below the elbow joint, the skin was cold, and the wound emitting a putrifying smell, indicating gangrene. So amputation of the arm was immediately performed at the middle of the upper arm by the circular method. The flap was stitched together and a rubber-tube inserted and covered by an antiseptic bandage. Strong nutritions and tonic measures were ordered. On October 3rd, the flap having healed by the first intention, the threads were removed. By the 28th, the strength of the patient was returning and so he was transferred to the Kure Naval Hospital. On December 3rd, the cicatrix of the stump was yet tender, so the part was protected with a bandage. On the 26th of the same month a certificate that he was disabled for life was forwarded to



K. Funakoshi, Fourth class stoker.
An example of the artificial arm given
by Her Majesty the Empress.

the admiralty, Her Majesty the Empress granted him an artificial limb, and he was discharged from the service. He is pensioned according to the regulations. (The artificial limb granted is shown in the illustration.)

225.—**Fracture of the left fore-arm and left 3rd rib with burns of face &c.**:—T. Shinozaki, aged 34, a gunner of the Hashidate, in the course of the battle of the Yellow sea, was firing in the fort of the 32 c. m. gun on the fore part of the upper deck, when a shell of the enemy burst against the inner surface of the gun-shield and the shell-fragments inflicted two blind wounds each 1.2 c. m. long at a part 5 c. m. above the wrist-joint in the front of the left fore-arm. The margins were lacerated, the wound reached to the bone, breaking the radius, and within the wound was a cubical shell-fragment (see figure 9.) 1.5 c. m. in diameter, which was extracted. Besides, over the sternal end of the left third rib was found a contused wound; with the fracture of the same costal cartilage beneath the skin. On the right side of the face, there was a burn of the second degree, and many minute shell-fragments and powder grains were seen in the right temporal region, the right membrana tympanum was also ruptured. Temporary measures were given for relief on board, and the patient was, on the 21st, conveyed to the Sasebo Naval Hospital. At the hospital several broken pieces of bone were extracted from the wound of the fore-arm, and very small shell-fragments more than ten in number were likewise removed from the temporal region. The wounds were dressed under strict antiseptic measures. The fracture of the rib cartilage was fixed with strips of adhesive plaster, and the rent of the right tympanic membrane stuffed with an antiseptic cotton plug. On December 10th, the wound on the temple had healed, and the fracture of the rib cartilage united, but the perforation of the membrana tympanum was not closed yet, and the hearing was impaired but without any discharge of pus. On April 3rd, 1895, the wound on the left fore-arm had healed, but the movements of the wrist joint were greatly interfered with; the perforation of the tympanic membrane still remained unhealed. However, the patient had recovered sufficiently to enable him to return to duty.

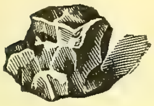


Fig. 9. Fragment of shell extracted from the wound of the left fore-arm.

(F). INJURIES OF THE HAND.

226.—**Contused wound of the left palm**:—C. Ishii, aged 36, a petty officer of the Matsushima, in the course of the engagement of the Yellow sea, was carrying a wounded man to the surgery in the fore part of the upper deck, when a 30.5 c. m. hostileshell exploded in the fore part of the lower deck, and caused all the ammunition provided for the side-guns to explode at once, so that the upper deck was forced up and rent open by the shock. A flying wooden splinter hit the ball of the left thumb inflicting a contused wound 2 c. m. in length and 1 c. m. in width. It was directly dressed with corrosive gauze. On October 3rd, it had healed by scabbing.

227.—**Perforated wound of the left hand and burns of both fore-arms:** —T. Umehara, aged 20, a junior bandsman, on board the Matsushima, in the battle of the Yellow sea, was standing in the fore part of the lower deck, to act as a carrier of the wounded, when a 30.5 c. m. hostile shell burst against the fort of No. 4 larboard gun of the same deck, and ignited the powder provided for the side-guns. One of the shell-fragments inflicted a perforating wound on the ball of the left thumb, and he received burns of both fore-arms. Temporary measures were directly given on board, and on the 20th of the same month the patient was conveyed to the Sasebo Naval Hospital. Conditions of the wounds :—The burns presented the symptoms of the 2nd degree, the skin mostly denuded and exposing the red surface of the true skin. The wound of the left hand had a round entrance orifice on the inner side of the thumb-ball, which measured 2 c. m. in diameter, and the passage of the wound was around the radial side of the 2nd metacarpal bone and found its exit on the back of the hand. The exit wound was somewhat larger than the entrance one, and the skin was rent open. The burns were dressed with wet boracic gauze, and the wound of the thumb with carbolic gauze. By October 11th, the burns healed, and the wound of the hand much improved. The patient was transferred, on the 28th, to the Kure Naval Hospital. On December 16th, he left the hospital to return to duty. (After the recovery of the wound flexion of the left thumb and index finger was slightly interfered with, which, however, caused no marked inconvenience.)

228.—**Compound fracture of the left metacarpal bones and contused wound of the head and buttock**:—G. Sugiyama, aged 28, a seaman belonging to the Akitsushima, in the naval engagement of the Yellow sea, was carrying shells to No. 5 side gun, when a shell exploded against the shield of that gun, and he was wounded by the fragments on the head, hand and buttock. On examination, on the left side of the occipital region, that is, at a point 5 c.m. above and behind the left mastoid process, a Y-shaped contused wound, 5 c.m. in length was found, and the scalp and occipito-frontalis were perforated, but without injuring the pericranium or the bone. On the dorsum of the left hand was found an irregular star-shaped, lacerated wound 3 c.m. in diameter at the ulnar side of the first metacarpus, which broke the 2nd, 3rd and 4th metacarpal bones and the exit found its way to the dorsal aspect at the radial side of the 5th metacarpus, where it presented a vertical lacerated wound 3 c.m. long. Bleeding was profuse but not arterial. Another contused wound was seen above and behind the great trochanter of the left femur, which was the size of the tip of the little finger, 3 c.m. in depth but without reaching the bone. Antiseptic dressings were applied to the wounds and a splint to the left hand. By a transport bound for home on the 19th, he was taken to the Sasebo Naval Hospital. At the time of admission, the wounds of the head and buttock had developed healthy granulation, while that of the hand suppurated, and the canal of the wound had an unhealthy granulation and retained some pieces of broken bone. These foreign bodies were extracted, the part washed with carbolic lotion and iodoform gauze applied. On the 28th of the same month, the injuries of the head and buttock were healed by granulation. The condition of the wound of the hand was unfavorable, so on the 30th, under the influence of an anæsthetic, the wound was enlarged, and a vertical incision made on the radial side of the metacarpus of the middle finger; the broken ends of the metacarpus of the index-finger were sawn away, but as the metacarpus of the middle-finger was smashed, it was taken off at the joints above and below; that of the ring-finger was smashed at its lower-end, so this part was separated from the metacarpo-phalangeal joint, but as the upper end of the bone was found intact, the broken end being pointed, was simply sawn away. Then the incision of the dorsum was sutured and a drainage tube introduced. On October 8th, the incision wound of the hand having accomplished the primary union, the threads were removed; the entrance and exit wounds on the dorsum still discharged a little pus but granulation was healthy. On December 7th, the entrance wound healed by granulation; but the exit still discharged some pus, from the sinus leading about 2 c. m. inwards and upwards so the sinus was touched with nitrate of silver. On January 24th, 1895, the exit wound at last cicatrized, but the removal of the metacarpi of the index, middle and ring fingers caused the loss of the functions of those fingers and moreover the movements of the thumb and little finger were greatly impaired. Thus disabled, he was, on March 16th, dismissed from the service for life, and pensioned according to the regulations.

229.—**Compound fracture of the right hand, perforating wound of the scalp, blind wounds of the upper and fore-arm and contused wounds of the shoulder and upper lip**:—T. Ibo, aged 24, a stoker of the Akagi, in the battle of the Yellow sea, was working in the fore part of thé lower deck as a fire-brigade, when an enemy's shell exploded on the upper deck and some of the shell-fragments injured both arms and the face. On examination, on the right shoulder was found an oval wound 5 c.m. in diameter and 1.3 c.m. in depth. A part of the deltoid muscle was torn away causing hæmorrhage. Over the insertion of the pectralis major on the inner side of the right humerus was a square wound 1 c.m. across and 1.5 c.m. in depth having an upward direction, at the bottom of which something hard was felt. On the ulnar side of the back of the right hand was an entrance wound 2.5 c. m. long and 1.3 c. m. wide with an exit on the same side of the palm which had broken the 5th metacarpus to pieces. On the back of the middle of the left fore-arm, and on the ulnar side of the back of the wrist were found irregular square wounds each 1.5 c. m. in diameter, and the margins were sharply cut; the depth was not great, and at the bottom of each wound small shell-fragments were lodged. Neither wound had injured the bones nor the joint. On the part below and to the left of the occipital protuberance were two small wounds 3 c.m. apart, which communicated under the scalp, but the bone was intact. From the middle of the upper lip running to the left and downwards, was found a lacerated wound 1.6 c. m. long, 3 m. m. wide and causing the flap to drop. Bleeding was stopped by the torsions and ligature of the vessels. Under an anœsthetic, the shell-fragments were extracted from the wounds of the right upper arm and the left fore-arm. The one taken out of the wound of the right upper arm was of an irregular flattened shape 1.5 c. m. in diameter, while those from the fore-arm were half the size of it

a. Shell-fragment extracted from the right upper arm.
b. ,, ,, ,, ,, left fore-arm.
c. ,, ,, ,, ,, the ball of the left little finger.

(see figure No. 10.) The wounds were managed under strict antiseptic treatment, the cléan margins of the wounds on the left forearm and the upper lip were sutured. On the 19th, the patient was sent to the Sasebo Naval Hospital, where all the wounds were found to be inclined to suppurate; as even the wounds of the left fore-arm and upper lip afforded no hope of union, the threads

a

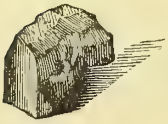


Fig. 10. (a) Fragment of shell extracted from the right upper arm ; (b) that from the left forearm ; (c) that from the ball of the left little finger.

were removed. From the perforating wound of the right hand broken pieces of bone were extracted, a drainage tube introduced and a splint put on. On October 21st, the wounds of the occipital region and the upper lip had healed. The other wounds became filled with granulation. On the 28th of the same month, the patient was transferred to the Kure Naval Hospital. At this time, the wound of the shoulder had contracted to the size of 3 c.m. in diameter. The perforating wound of the right hand had left only a slender wound with healthy granulation. But with regard to the wounds of the middle of the left fore-arm, the back of the wrist and the right upper arm the granulation was of a dull character presenting an œdematous condition. So the unhealthy granulation was scraped off, iodoform was sprinkled on and carbolic gauze applied. On November 8th, the wounds of the right upper arm, the left hand and forearm were all cured. The patient complained of a pain at the ball of the left little finger where, on examination, something hard was felt. Cutting it open, a square shaped fragment of shell 1 c.m. in diameter was obtained (c. in figure 10). This was perhaps one that had entered by the wound on the back of the wrist-joint. On November 15th, the incised wound on the ball of the little finger was cured by the first union. On the 25th of the same month, the wound on the left wrist cicatrized. Now, therefore, the only wound remaining was that of the right shoulder, and the granulation becoming relaxed, and anæmic symptoms accruing, healing seemed to have stopped. A mixture of quinine and iron was administered internally, as the general strength of the patient seemed greatly weakened. Then the nutrition of the body returned by degrees and the wound of the shoulder was cured, by January 31st, 1895, by forming cicatrix, but owing to the lesion of the deltoid and its adhesion to the skin, the movements of the right shoulder became hindered the function of the right little finger also was not perfect. Moreover, the left upper extremity was generally emaciated, so that the grasping power was greatly lessened. Thus disabled, he was dismissed from the service for life, and on February 9th left the hospital, and pensioned according to the regulations.

230.—**Lacerated wounds of the right and left hands, the head and blind wound of the left leg :**—Y. Kanayama, aged 27, one of guncrew of the Fuso, in the course of the battle of the Yellow sea, was resting on the larboard side of the funnel casing, having been ordered to stop firing, when a hostile shell pierced through the lower part of the funnel and broke it to pieces, and some of the broken fragments mutilated his right hand, except the ulnar side, and the little finger, and exposed the lower end of the radius; the skin, muscles and tendons about the wrist were lacerated and attended by hæmorrhage. Also on the left side of the occipital region was found a lacerated wound 2.5 c.m. in vertical and 1 c.m. in transverse diameter and another one 2 c. m. in vertical and 1 c. m. in transverse diameters on the ball of the left little finger, and a third of 2 c. m. on the inner side of the left leg, in which an irregular iron fragment 2 c.m. long and 1.5 c.m. wide was felt and extracted. After stopping the hæmorrhage of each wound, antiseptic bandages were applied, and the patient was kept perfectly quiet. On the 18th next, the right fore-arm was amputated at its lower third by circular incision; the skin flap was then sutured, and dressed antiseptically. On the 19th, the temperature was normal, and the same day he was taken on board a transport, and admitted to the Sasebo Naval Hospital on the 21st. At the time, the wounds of the occipital region, the ball of the left little finger and the left leg were suppurating owing to the bruise of their margins. As a part of the stump of the fore-arm began to suppurate the threads were removed and a drainage-tube introduced, and all the wounds were strictly managed antiseptically, and progress was favourable. By the end of October, only a small granulating surface remained on the stump, all the other wounds had cicatrized. On the 28th, he was transferred to the Kure Naval Hospital. On February 18th, the granulating surface of the stump had healed by scabbing. On the 26th, a certificate of his inability for service was forwarded to the admiralty, the artificial limb which Her Majesty the Empress was pleased to grant him was given him and he was discharged from the service for life ; with regular pension.

(G) INJURIES OF THE FINGER.

231.—**Abrasion of the right index and middle fingers** :—T. Goto, aged 24, a seaman of the Saikyo-maru, in the engagement of the Yellow sea, was firing the 47 m. m. Q. F. gun on the starboard side in the fore part of the upper deck, when a hostile shell came from the starboard and broke off the derrick of the fore-mast. One of the broken wooden splinters wounded him on the right fingers. On examination, on the back of the right index and middle fingers were found abrased wounds with slight hæmorrhage but without any lesion of bones. Carbolic gauze was applied. On the 20th of the same month, they had healed by scabbing.

232.—**Abrasion of the right index finger**:—I. Takuma, aged 29, one of the gun-crew of the Fuso, in the course of the battle of the Yellow sea, was resting on the larboard side of the funnel-casing, when an enemy's shell struck the funnel and broke it into pieces. One of the broken fragments of iron inflicted an abrased wound on the back of the terminal joint of the right index finger, peeling the nail and skin away. The wound was sealed with sublimate gauze and he resumed work directly. The wound had healed on October 4th.

233.—**Contused wound of the right index finger**:—J. Shinowara, aged 28, one of the gun-crew of the Akagi, in the battle of the Yellow sea, was firing the larboard No. 6 Q. F. gun on the stern of the upper deck, when a hostile shell broke the starboard side of the stern. The broken pieces of iron were driven about, and some of them wounded him on the right index finger. On examination, there was found a lacerated wound running from the ulnar side of the base of the right index-finger, along the back of the finger to the upper part of the 2nd joint; at the bottom of it, the extensor tendon was exposed and hæmorrhage was profuse, on the palmar surface of the 1st joint of the same finger there was a contused wound of a square form 1.5 c.m. across, the margins were irregular, and everted; these two wounds seemed to be the entrance and exit wounds of the same injury, but they did not communicate with each other, no foreign body was found nor any lesion of bone. The blood vessels were ligatured and an antiseptic bandage applied. On the 19th, the patien, was sent to the Sasebo Naval Hospital. After admission, progress was favourablet and on the 31st of the same month, both wounds filled with granulation so as to become level with the skin. On this day, he was transferred to the Kure Naval Hospital. On October 24th, cicatrix formed, and he returned to duty perfectly recovered.

234.—**Contused wound of the right middle finger with burns of the left upper arm**:—S. Kobayashi, aged 31, one of the gun-crew of the Hashidate, in the course of the engagement in the Yellow sea, was in the fort of the bow gun in the fore-part of the upper deck, when a hostile shell burst, striking the inner wall of the shield of the gun. At the moment, by some of the shell-fragments he was inflicted with a contused wound on the 2nd joint of the right middle finger, and an abrasion the size of a pin-head in the lower margin of the right cornea. Besides, by the flame of the explosion, burns of the 1st and 2nd degrees were sustained in the lower part of the left upper arm down to the tips of the fingers. Temporary relief was directly given on board, and on the 21st, the patient was admitted to the Sasebo Naval Hospital. Then atropine was dropped into the injured eye and a compress of boracic lotion applied. Antiseptic bandages were applied to the lacerated wound and burns. On October 11th, the lesion of the eye and burns of the left upper arm were healed, but with the lacerated wound of the right middle finger there was still pus discharge, and granulation was unhealthy, and the joint became inflamed. A wet carbolic compress was applied to the inflamed joint. On November the 8th, the wound of the middle finger was healed by scabbing; the inflammation of the joint had also subsided, but the flexion of the joint was not satisfactory, so local bathing and active movement were ordered. On November the 22nd, the patient had perfectly recovered and returned to duty.

235.—**Contused wounds of the left fingers, and left side of the chest:** —K. Matsuo, aged 29, a seaman of the Akagi, in the engagement of the Yellow sea, was engaged in firing on the fore-top, when a hostile shell came to the top and burst there. At the moment by the shell-fragments, he was wounded in the chest, left hand and leg, and was stunned by the concussion. He was immediately lowered from the top and carried to the surgery where he was first given a draught of brandy to revive him. Then on examination, circular wounds, respectively 6 m. m. were found located in the 1st phalanges of the left middle and ring fingers; the bottoms reached the bones, but without incurring any lesion to the periosteum nor to the bones. The borders of the wounds had numberless black spots owing to the penetration of powder grains. Again on the left side of the chest were two abrased wounds; and on the inner side at the upper third of the left leg, an abrased wound was noticed. Sublimate gauze, to the wounds was applied and being taken on board a transport on the 19th, the patient was delivered to the Sasebo Naval Hospital on the 21st. Progress was favorable and by the 30th of the same month, the wounds of the fingers and chest healed, but the action of the injured fingers was not perfect especially the flexion; also the wound of the left leg still remained. The same day he was transferred to the Kure Naval Hospital. Now the power of the injured fingers was gradually returning, and the wound of the left leg improving, he left the hospital on October 24th to return to service.

236.—**Contused wound of the left fingers:**—K. Miyata, aged 21, a carpenter of the Yoshino, in the course of the Yellow sea battle, a hostile shell hit the starboard side in the fore part, that is, the outer wall of the coal-bunker and exploded breaking the outer plating of the ship's side. To repair the hole made on the outer plating, be was out on the ship's side, when by the sharp edges of the hole, he inflicted wounds on the hand and fingers. On examination, shallow contused wounds on the palmar aspects of the 2nd phalanges of the thumb, middle and ring fingers were discovered with slight hæmorrhage. Sublimate gauze was applied. On the 21st of the same month, they healed under scabs.

237.—**Lacerated wound of the right thumb**:—H. Hayakawa, aged 26, a stoker belonging to the Hiyei, in the naval engagement of the Yellow sea, was posted as a member of the fire-brigade, and was working; as a temporary assistant to a shell carrier, in the 4th division of the lower deck when a hostile shell exploded in the ward-room of the 5th division. At that moment, he received a lacerated wound on the right thumb by one of the flying wooden splinters. After being temporarily dressed on board the ship, the patient was sent to the Sasebo Naval Hospital and admitted on the 21st of the same month. The condition of the wounds, was this; on the ulnar side of the ungual phalanx of the right thumb was found a vertically lacerated wound 2 c.m. in length and 1 c.m. in depth but not reaching the bone, besides, the nail of the left great toe was stripped off. The patient perfectly recovered on October 1st and returned to the service.

238.—**Lacerated wound of the left thumb**:—M. Okura, aged 20, a stoker on board the Hiyei, in the engagement of the Yellow sea, was posted as a member of the fire-brigade, and was temporarily assisting to carry shells. When he was passing the 4th section of the lower deck, a hostile shell exploded in the ward-room of the 5th section, and he was wounded on the left thumb by one of the flying shell fragments. Simple dressing was used on board, and on the 21st following he was conveyed to the Sasebo Naval Hospital. Condition of the wound:—On the ulnar side of the left thumb was found a vertically lacerated wound, the margins of which were torn raggedly, and which was 3 c.m. long and 1 c.m. in depth, but not reaching the bone. Under the use of an antiseptic bandage, it healed by granulation. He left the hospital completely cured on October 19th to resume his duties.

239.—**Simple fracture of the right thumb**:—U. Shibuya, aged 30, one of a torpedo crew of the Hiyei, at about 11.30 a.m. September 17th, 1894, just before the commencement of the battle of the Yellow sea, while assisting in conveying a torpedo, he slipped down by accident in the fore part of the lower deck. He happened to thrust his right thumb against the deck causing a fracture at the middle of its first phalanx. On trying to move the thumb, crepitation was felt and severe pain. The fracture was a transverse one, its broken ends remaining at their natural position without intersecting one another. The thumb was fixed by a splint and he directly betook himself to work, but the thumb gradually became swollen and painful so that after the battle was over he could not continue his work. Therefore he was, on the 21st of the same month, admitted to the Sasebo Naval Hospital. There, the injured part was fixed by a splint as before, and on October the 12th the fracture joined, the splint was removed, and the movements of the thumb were tried, but as the grasping power was found imperfect, he was told to exercise its active movements. On October 17th, completely healed, he returned to the service.

240.—**Compound fracture of the right index-finger** :—T. Kubota, aged 34, assistant engineer of the Naniwa, in the battle of the Yellow sea, was in the engine-room when the heavy stern gun was fired, the shock of the discharge caused him to lose his balance and in putting out his arm to recover himself he had his right index-finger seized between the radius-rod of the eccentric and the connecting rod of the transmission lever, thus causing a complicated fracture of the 1st phalanx of the index-finger and a lacerated wound 5 c. m. long extending from the palmar aspect of the root of the index-finger to the palm of the hand. The wound was a gaping one with profuse bleeding and the 1st phalanx of the finger was obliquely broken. Both ends of the fractured phalanx were replaced and fixed by a splint. Progress auspicious. On October 15th, the wound healed leaving a slight derangement of motion in the 1st joint of the injured finger.

241.—**Compound fracture of the left index-finger and burns of the face, neck, back, fore-arms, buttocks and legs** :—M. Yoshikawa, aged 24, one of the gun-crew of the Matsushima, in the course of the naval battle of the Yellow sea, was in the fort of No. 9 gun on the starboard side in the fore part of the lower deck when a 30.5 c.m. shell of the enemy burst against the shield of No. 4 side-gun on the port side of the same deck. Immediately, ammunition provided for the side-guns caught fire and exploded, and he received a compound fracture of the 2nd phalanx of the left index-finger by one of the fragments of the shell ; besides, from the explosion flame, burns of the 2nd degree on the face, ears, neck, back, and on the back of the fore-arms, left buttock and the lower parts of the legs. To the burns were applied oiled lints, and sublimate gauze to the wound of the finger. On the 20th the patient was conveyed to the Sasebo Naval Hospital. Conditions of wounds :—

The 2nd and 3rd phalanges of the left index-finger were found smashed, the soft tissues also destroyed, so that the finger hardly remained connected by a healthy part on its ulnar side. With the burned surfaces, the skin was turned black, blisters appearing here and there and sloughs at some places; especially the upper part of the left ear which was deeply burned. The left index-finger was cut away at the 2nd joint, the flap sutured and then covered with sublimate gauze. Cloths wet with a boracic solution were applied to the burns. On October 11th, the burns were all cured but leaving a loss of tissue in the upper part of the lobe of the left ear. The amputated stump of the index-finger partly suppurated, so being cut open was washed with carbolic lotion and covered with carbolic gauze. On December 22nd, the amputated stump formed cicatrix, but on account of pain in the stump, the injured hand could not be used, so a protecting bandage was applied. On account of his inability for duty owing to the loss of the left index-finger, he was dismissed from the service for life and left the hospital on March the 16th, 1895, and is pensioned according to the regulations.

242.—**Crushed wound of the right index and middle fingers**:—S. Okano, aged 22, one of gun-crew of the Takachiho in the battle of the Yellow sea, was firing on the fort of No. 4 gun on the port side of the waist-deck, when he had the right index and middle fingers seized between the gun-gears. Both fingers were crushed away from the base of the 2nd phalanges, and left hanging by a part of the flexor tendons. The wounds were ragged and bleeding, the ends of the crushed bones protruding. The soft tissues hanging down were cut off, the sharp ends of th, bones pared, and hæmorrhage checked; then the wounds were closed with antiseptic bandages. The patient was sent back by a transport starting for home on the 19th and was admitted to the Sasebo Naval Hospital on the 21st. Some days after, a swelling ensued, extending from the injured fingers up to the back of the hand accompanied by a pain which prevented his sleeping; and the broken ends of the phalanges still remained exposing themselves at the wounds, so on the 27th both the index and middle fingers were amputated at the distal extremities of the 1st phalanges. The margins of the wounds were sutured and antiseptic bandages applied. On October 2nd, the swelling of the back of the hand and pain entirely disappeared; the threads being cut away, a little serum mixed with blood came out of the stitch-holes but no pus was seen. Dry sublimate gauze was applied. On the 4th, the sutured wounds accomplished the primary union, and simply a protecting bandage was made use of.

On the October 30th, he was dismissed from the service for life having been adjudged unfit for duty again, owing to the loss of these two fingers and he left the hospital. He is now a pensioner according to the regulations.

243.—**Mutilation of the limbs with burns of whole body**:—T. Hisadami, aged 27, a petty officer on board the Matsushima, in the naval engagement of the Yellow sea, was in the neighborhood of the powder magazine in the fore part of the lower deck, as the chief officer of the magazine, when a hostile shell burst against the shield of No. 4 gun on the port side of the lower deck, and at the same time ignited the ammunition provided for the side-guns. By this accident, he was burned all over the body, and having all his limbs mutilated, he died on the spot.

244.—**Partial mutilation of the limbs with extensive burns**:—M. Furuya, aged 27, one of the gun-crew of the Hiyei, in the battle of the Yellow sea, was firing the No. 4 gun on the port side, when an enemy's shell flew in over the starboard waist netting and burst against the stanchion of the booms on the port side. At the moment, by some of the fragments of shell he sustained terrible wounds in the upper and lower limbs, mutilating the soft tissues as well as bones. Moreover, a flying shell fragment struck the powder case carried by another man and set it on fire, thus igniting his clothes which gave him burns over a larger part of his body. He died immediately.

8.—INJURIES OF THE LOWER EXTREMITY.

(A) INJURIES OF THE GLUTEAL AND INGUINAL REGIONS.

245.—**Blind wound of the left gluteal region**:—T. Hashiguchi, aged 19, a cook on board the Takachiho, in the battle of the Yellow sea, was in the gun support, turning the fan leading to the magazine, when a hostile shell exploded striking the starboard side of the after part. One of the shell-fragments piercing the ship's side dashed into that gun support and inflicted on him a lacerated wound of an irregular shape, 2 c.m. in diameter, and 3 c.m. below and behind the great trochanter of the left femur. The wound had serrated edges, attended with a slight hæmorrhage. The wound took a winding course forwards and down-wards between the muscles to a depth of 7 c.m. On probing no foreign bodies were found. An atiseptic bandage was applied. Taken on board a transport bound home on the 19th, the patient was admitted to the Sasebo Naval Hospital on the 21st. There was a slight pus discharge from the wound, but under antiseptic measures it progressed favorably, and the canal of the wound filled with granulation by degrees, the patient completely recovered and left hospital on October 11th.

246.—**Contused wound of the right inguinal region and blind wound of the left leg**:—S. Imagawa, aged 23, a stoker on board the Akitsushima, in the course of the battle of the Yellow sea, was going to change the direction of the ventilator of the engine-room, by the side of the engine-room hatch in the fore-part, when a hostile shell burst against the shield of No. 5 side-gun on the starboard waist of the upper deck. He received lacerated wounds by some of the flying shell-fragments, on the right inguinal region and on the inner part of the upper third of the left leg. On examination, along the inner side of the right spermatic cord was found a lacerated wound of the size of the tip of the little finger, attended by bleeding. An examination, showed that the wound took a course deeply inwards and down-wards towards the scrotum but did not reach the cavity of tunica vaginalis, and the spermatic artery escaped the injury, hæmorrhage was not heavy. Also, on the inner side of the left tibia below the knee joint, was a blind wound 2 c.m. in diameter; and a small shell-fragment was lodged, but without giving any lesion to the bone; it was extracted. The wounds being antiseptically dressed, the patient was enjoined to strict rest. Some days after, the scrotum became swollen and tense, so that it reached 29 c.m. in circumference, attended with pain and subcutaneous extravasation. It gave fluctuation to the touch; urination was normal, and the temperature also normal. The scrotum was treated by lead lotion. On the 19th, symptoms remained the same, and on the same day he was taken on board a transport and was admitted to the Sasebo Naval Hospital. Conditions of the wounds:—The inflammatory swelling of the scrotum had spread to the perineum, the scrotum was raised by means of a pad and cold applied constantly. On the 25th, the scrotum remained still swollen, but pain had greatly decreased. On October the 5th, the inflammatory swelling of the scrotum subsided, and the testes were found to be swollen also, the extravasation of blood in the scrotum became so hardened that it could not be absorbed, so the hair on the scrotum was shaved away, and under strict antiseptic precaution, the skin was cut open and a large quantity of coagulated blood extravasating between the subcutaneous connective tissues was evacuated, followed by the introduction of a drainage tube and the application of an antiseptic bandage. On the 10th of the same month, the incised wound of the scrotum evacuated only a brownish liquid without suppuration, so the drainage-tube was removed, and antiseptic gauze was filled into it. The wounds on the inguinal and tibial regions became small with healthy granulation. On the 25th, the wound of the left leg formed cicatrix, and on November the 12th, that of the inguinal region accomplished cicatrization leaving an induration there. The swelling of the testes had not entirely subsided, and gave much pain to pressure, the incised wound of the scrotum not closing yet, some pus escaped from it. By the middle of December, the swelling of the testes had nearly disappeared, and the incised wound of the scrotum almost healed. On January 12th, 1895, the patient completely recovered and returned to the service.

(B) INJURIES OF THE THIGH.

247.—**Contusion of the right thigh** :—Y. Takagi, agad 43, Chief Navigating Officer of the Combined Squadron on board the flagship Matsushima, at the time of the attack of the eastern forts of Liukung Island, was standing on the fore bridge when a hostile shell passed over the said bridge, rebounding from the sea on the port bow. On this occasion, by some of the broken wooden splinters caused by the passage of the shell, he was struck on the right thigh and mons veneris. The inner side of the right thigh was swollen all over and attended by pain, also the mons veneris was swollen to the size of a goose-egg. But in neither place did there exist signs of subcutaneous extravasations nor injury to the bone. Lead lotion was applied and the swelling as well as the pain in both places gradually subsided, and he was soon completely cured.

248.—**Contusion of the right thigh with burns of the right leg** :—S. Nakashima, aged 26, one of gun-crew of the Yoshino, in the battle of the Yellow sea, was standing on the fort of No. 8 3—pounder on the waist-deck, when a hostile shell after piercing through the starboard netting, collided against 12 c. m. shells placed in rows along the ship's side and burst with them at once. By one of the flying shell-fragments he was struck on the outer-side of the right thigh, and at the same time received a burn on the lower part of the right leg by the explosion gas. On examination, the part struck on the thigh was found swollen, presenting a dark purple colour ; and the burned part of the leg was reddened to the size of the palm. The contused part was painted with spirit of camphor, and the burned surface was covered with oiled lint. On the 21st of the same month both healed completely.

249.—**Contusion of the left thigh** :—S. Seto, aged 34, a clerk on board the flagship Matsushima, in the naval engagement of the Yellow sea, was posted as a carrier of wounded, and brought a wounded man into the petty-officers' room in the fore part of the upper deck, and while standing there, a 30,5 c. m. shell burst in the fore part of the lower deck, and exploded the ammunition of our side guns. By one of the broken pieces of the ship's planks he was struck on the outer-side of the left thigh. On examining, the injured part, there was found a slight subcutaneous extravasation and swelling, and he could only walk with difficulty. Lead lotion was applied, and by the 25th of the same month he had perfectly recovered.

250.—**Abrasion of the left thigh**:—K. Tateyama, aged 24, a stoker on board the Matsushima in the Yellow sea battle, was in the engine room, when a hostile shell broke the iron plate at the entrance. By one of the iron-pieces he received an abrasion in the lower part of the front of the left thigh. A sublimate gauze was applied, and on the 20th following, he was conveyed to the Sasebo Naval hospital. At that time, in front of the lower third of the left thigh was found a shallow wound 5 c. m. long and 4 c. m. wide. The true skin lay bare, and was slightly suppurating, the borders of the wound were somewhat swollen with pain. Sublimate gauze was applied and progress was auspicious. On October 22nd, the patient completely recovered and left the hospital to return to service.

251.—H. Shimamura, aged 36, flag lieutenant of the Standing squadron, on board the Matsushima, in the Yellow sea engagement, was standing on the fore bridge when a fragment of a hostile shell came and inflicted on him an abrased wound 3. 5 c. m. long, and 2.5 c. m. wide, on the outerside of the middle third of the left thigh. Sublimate gauze was applied, and the 20th of the same month the wound healed completely under scabs.

252.—**Contused wound of the right thigh and left arm**:—A. Imai, aged 29, a gunner of the Katsuragi in the course of the bombardment of the eastern fort of Liukung island, was aiming the bow gun for the enemy's fort, when a hostile shell struck the gun-barrel; he fainted from the shock and was unconscious for two or three minutes. At the same time, by some of the broken wooden splinters, he received a contused wound in the inner side of the upper part of the right thigh; the skin was lacerated and there was great pain. Besides, on the inner and front of the upper part of the left arm there was a small abrasion with subcutaneous extravasation around it. No lesion of bone in either wound was present. In a few days, the abrased wound of the upper arm healed, but with that of the thigh, the lacerated skin had sloughed and the area enlarged. Under appropriate treatment granulation developed but it turned dull, and discharged pus, so that it greatly retarded healing. On March the 30th, the unhealthy granulation was scraped away, and iodoform sprinkled over. By the end of the month, the granulating surface improved, and pus discharge consequently decreased. On April 19th, the wound was completely healed.

253.—**Gutter wound of the left thigh**:—D. Sato, aged 35, a bandman of the flagship Matsushima, in the course of the Yellow sea battle, was acting as a carrier of wounded, and was standing in the fore part of the upper deck when a 30.5 c. m. hostile shell burst in the fore part of the lower deck. By one of the fragments of shell he received a grooved wound 3 c. m. long and 5 m. m. wide, in the lower part of the left thigh, penetrating only the subcutaneous tissue obliquely. He was treated on board the ship, and was then transferred to the Hashidate and examined on the 30th following: the middle of the injured part developed favorable granulation, but the edges still presented grayish colour and discharged pus. By the middle of October, the wound developed healthy granulation, pus discharge diminished, and on the 24th, the wound became shallow by granulation with no more escape of pus. Boracic ointment was applied, and on November the 4th, it healed by the formation of cicatrix.

254.—**Blind wound of the right thigh**:—H. Ono, aged 27, a senior clerk on board the Itsukushima, in the engagement of the Yellow sea, was posted as a shell carrier, and was passing by the side of the tower of the 32 c. m. gun in the fore part of the upper deck, when a hostile shell explodéd piercing through the port netting in the fore part of the same deck. By some of the shell fragments he received two wounds; a blind wound in the upper part of the right thigh, just below the outer third of the Poupart ligament, which was an irregular lacerated wound 4. 5 c. m. diameter, and 10 c. m. deep towards the back; and on the inner side of the middle part of the same thigh was a square wound 10 c. m. in diameter, stripped of all the skin. Simple dressing was applied on board, and he was taken on a transport bound for home on the 19th, and was admitted on the 21st to the Sasebo Naval Hospital. On examination, the wound of the upper part of the thigh was found to take a course backwards towards the posterior inferior spine of the ilium, and to form an abscess there. Therefore that part was cut open, and pus evacuated, also a shell-fragment of an irregular shape 5 c. m. long, 2. c. m. wide and 1. 5 c. m. thick to which a piece of white cloth (part of his

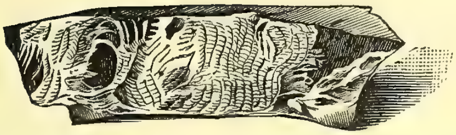


Fig. 11. Fragment of the shell extracted from the right gluteal region. (a piece of white linen was attached).

linen trousers) was sticking, was extracted (see figure 11). On October, the 28th, the canal of the wound was filled with granulation and pus discharge decreased, the wound in the middle of the thigh had already dried up. On this day, the patient was transferred to the Kure Naval Hospital, and progress was so favorable, that on February the 6th, 1895, he was completely healed and returned to service.

255.—**Blind wound of the left thigh with crushed right middle finger:** —I. Matsushima, aged 24, a stoker on board the Hiyei, in the course of the battle of Yellow sea, was as a member of the fire brigade, standing by the No. 5 pump in the 4th division of the lower deck, when an enormous shell of the enemy exploded in the ward-room in the fifth division. He received wounds on the right fingers, and left thigh from flying shell-fragments. By this accident all the medical staff on board were killed, so his wounds were simply dressed by a mate of the ship and he was properly treated by one of the surgeons from another vessel, when she arrived at the station near Cape Choppeki next morning. Conditions of the wounds:—On the ulnar side of the ungual phalanx of the right index finger, and at the tip of the right middle finger were found lacerated wounds; the ungual phalanx of the middle finger was crushed, and in the tip of the right ring finger there was also a lacerated wound. Again, on the inner and posterior part of the left thigh was a blind wound, and an abrased wound on the calf of the left leg. Antiseptic dressings were applied to all of them. By the transport Genkai-maru bound home, the patient was sent to the Sasebo Naval Hospital and admitted on the 21st. On Examination, on the inner and posterior side of the upper third of the left thigh, a lacerated wound of the size of the tip of the thumb was located, which discharged pus. It measured, on probing, 10 c. m. in depth running down-wards and inwards in the substance of the adductors, at the bottom a foreign body was felt; on being extracted it proved to be an irregular plate-shaped shell fragment, 3 c. m. long, 2 c. m. wide, (see the fig. 12.) and a piece of serge. With all the other wounds, granulation developed favorably under antiseptic treatment. On the 30th, he was transferred to the Kure Naval Hospital, and On October the 7th, the abrased wound of the left leg, and the lacerated wounds of the right index and ring fingers had healed; the lacerated surface of the

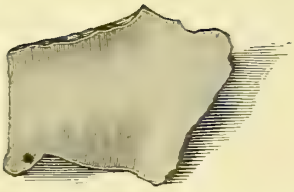
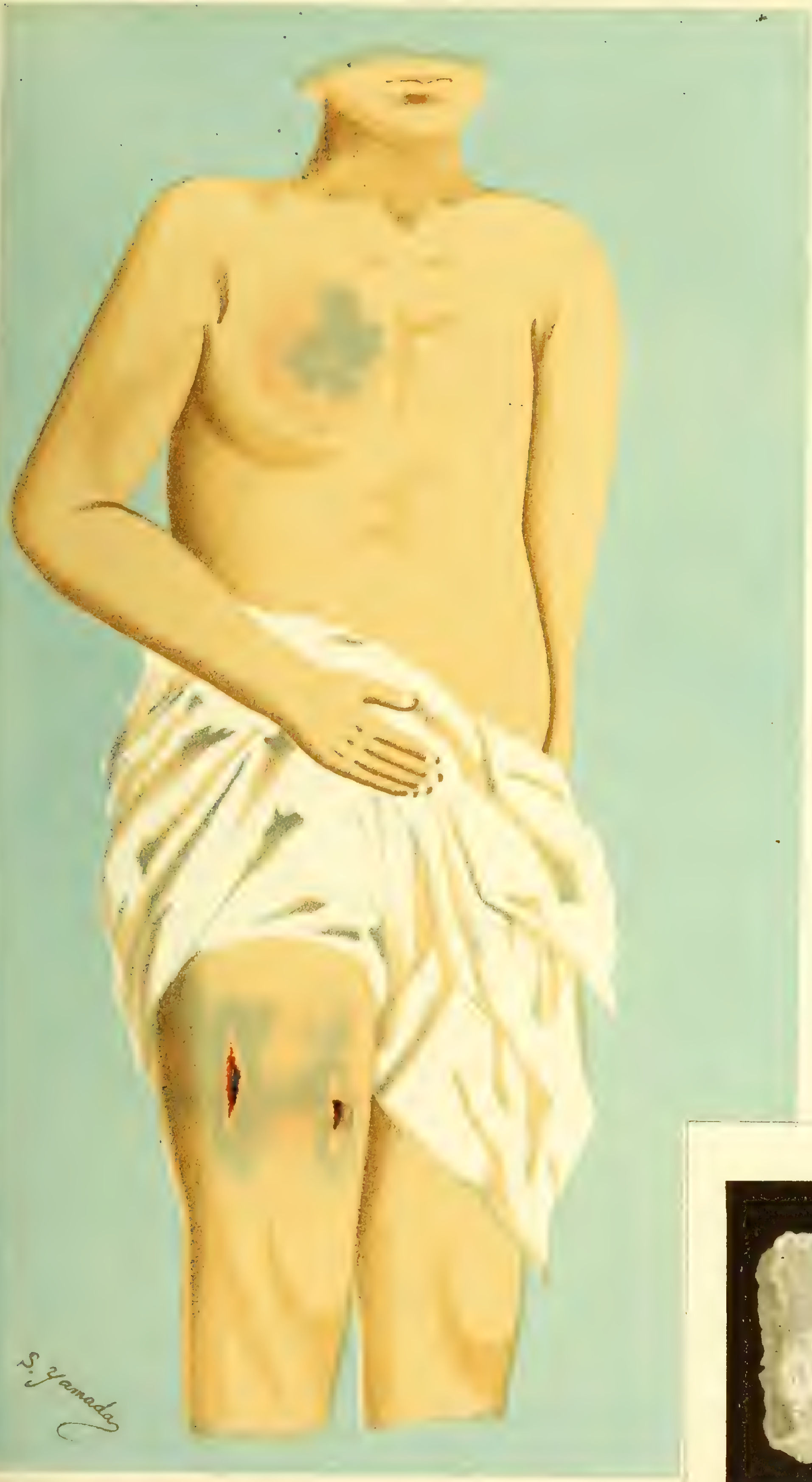


Fig 12. shell fragment extracted from the bottom of the wound in the left thigh.

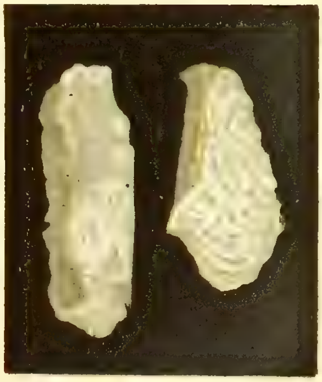
right middle finger became narrow by granulation, but the blind wound of the thigh still evacuated pus abundantly, so a counter opening was made and a drainage tube introduced. On the 25th, the wound of the middle finger healed completely by cicatrization, and the canal of wound in the thigh became somewhat narrower, and pus discharge decreased. On December the 18th, the wound of the thigh became contracted, and there was a tendency to pus accumulation ; the temperature rose at times ; so in order to facilitate the discharge it was enlarged by an incision. Still the granulation in the canal was unhealthy. A mixture of quinine and iron was internally administered, with strict application of antiseptic measures. Time elapsed without much change owing to the difficulty of healing the wound in the muscular substance; and by June next year, the walls of the canal of the wound indurated, and discharged thin pus. There was no prospect of healing the wound so the canal was cut open, and the indurated wall was scraped away. After that the granulation improved by degrees, and the canal became narrow and on August the 30th healed by a cicatrix 7 c. m. long. However, the left thigh became wasted measuring 3. 5 c. m. less in circumference compared with that of the healthy side. Walking proved difficult owing to the pain caused by the stretching of the cicatrized part. As for the right hand, the second joint of the index finger could not freely be bent or extended on account of the cicatricial adhesion and the middle finger lost the ungual phalanx, and the ring finger also had the second joint ankylosed, so that the grasping power was much weakened so as to make him unfit for service. Therefore he was dismissed from the service for life on December the 20th and is a pensioner according to the regulations.

256.—**Glancing wound of the right thigh with abrasion of the abdmen:** —K. Tokunaga, aged 31, a signal-man on board the Akagi in the cours of the Yellow sea engagement, was standing on the bridge, when a shell-fragment came flying on the bridge from the fore part of the starboard side. He was wounded on the right thigh. On examination, on the inner and posterior aspect of the upper third of the right thigh was found a circular wound 13. 3 c. m. in diameter, in which the muscular substance had been deeply torn, so that the adductor magnus was severed and was hanging down. Located behind the above wound was a lacerated lesion of an irregular square-form 4.5 c. m. in length, the edges were everted, and at the bottom communicated with the lower part of the former wound; probably the former was the entrance wound while the latter the exit. Fortunately the large vessels escaped injury and there occurred no copious hæmorrhage. Besides these, there was an abrased wound 6 c. m. in diameter, over the right iliac region. To the wounds of the thigh, a drainage tube was introduced and they were dressed with antiseptic bandages. On the 18th, the dressing was renewed as it had been soiled by exuding blood. The wound on the abdomen was inflamed, and the temperature rose to 39.°6 C.; but no abnormal sign in the abdominal cavity was found. The part was covered with a wet carbolic dressing; and the patient was kept in strist repose. On the 19th, the temperature lowered a little indicating 38°. 8 C. There were no unfavorable signs in the wounds Taken on board a transport, he was admitted to the Sasebo Naval Hospital on the 21st. At that time, the inflammation of the wound had abated, the temperature had lowered to 37°. 5 C.; and the wound of the thigh presented a sloughy condition and evacuated unhealthy pus. The sloughs were scraped off, followed by the application of iodoform, and a wet carbolic gauze. On the 22nd, the temperature fell to normal and the wound became somewhat cleaner. By the 30th the sloughs of the thigh wound had entirely come off, the granulation had improved, and the pus discharge had diminished, and the abrased wound of the iliac region had almost dried up. This day the patient was transferred to the Kure Naval Hospital. On October the 8th: the wound of the abdomen healed by scabbing. With that of the thigh, pus discharge gradually decreased, accompanied by the development of granulation, so that the torn surface and the canal of the wound was filled. On November the 10th: the wound on the back of the thigh was healed, and that of the inner and posterior aspect having almost ceased to discharge pus, granulation developed to the level of the skin, however, as, the torn surface was extensive, there was no hope of perfectly developing the epithelial covering, so seven small pieces of skin taken from the inner side of the left thigh, were grafted. On the 18th, five grafts had taken effect while the other two were sloughed. On the 24th, another transplantation with seven pieces was tried, and on being examined on the 27th, the seven pieces of skin were found ingrafted, since then the epithelium developed gradually in a radiant shape from the grafted skin, and the surface of the wound at last became remarkably small. The conditions of the wound when examined on January the 18th, 1895; was such that there remained only a shallow wound on the inner and posterior aspect of the thigh, boracic ointment was applied to it. On March the 6th, the wound had healed with cicatrix, and the patient left the hospital to return to service.

257.—**Perforating wound of the right thigh with contusion of the chest**:—N. Tabako, aged 29, one of gun-crew of the Tenryu, in the course of the bombardment of the Eastern forts of Liukung Island, was standing under the starboard booms on the waist of the upper deck, when a hostile shell exploded striking the gun-gear of No. 2 side-gun on the port side. By one of the shell-fragments, he was pierced through the soft tissues from the outer side to the inner of the lower third of the right thigh. The entrance wound had an irregular triangular shape, 3 c. m. at base, and about 2 c. m. at each side; the exit wound was irregularly lacerated in vertical lines being 3 c. m. in length. Out of the exit wound, shell-fragments were seen exposing themselves, which being extracted, one was found to be 3.6 c. m. in length, 1 c. m. in width, and the other to be 3 c. m. long and 1.5 c. m. wide (the wound and the fragments are shown in the illustration). Hæmorrhage was slight. Over the 3rd and the 4th ribs in front of the right side of the chest was found a subcutaneous extravasation about the size of the palm which was very swollen and painful, there was also a slight hæmoptysis, but no lesion was found of the ribs. The wound of the thigh was washed with carbolic lotion and a drainage tube introduced, followed by the application of a sublimate gauze bandage; and to the chest was applied a lead lotion. The patient was removed to the hospital-ship Kobe-maru. At night, cough became frequent, attended by a pain in the right side of the chest at deep inspiration. The patient was ordered to keep quiet and an anodyne mixture was administered. On the 14th, the wound of the thigh suppurated, presenting sloughs at the bottom, so the latter were scraped off, and iodoform gauze was applied. Pain in the chest and bloody expectoration still did not subside, and a crepitation was heard in the right lung. The former prescription continued. On the 20th, he was conveyed to the Sasebo Naval Hospital. Examined then, the wounds of the right thigh were found still to communicate with each other, and the canal was already beginning to develope healthy granulation, with slight pus discharge. Pain in the chest and coughing still existed, but the bloody expectoration had ceased, and on physical examination of the chest no abnormality was found in the lungs, heart, nor pleura. To the wounds of the thigh a drainage tube was introduced and they were dressed with carbolic gauze. On March the 2nd, the canal of the wound on the thigh became narrow and filled with granu-



N. TABAKO. LEADING SEAMAN. TENRYU I.J.S.
PERFORATING WOUND OF THE RIGHT THIGH



FRAGMENTS OF THE SHELL EXTRACTED
FROM THE LUMBER REGION

lation, so that the drainage-tube was replaced by gauze. Progress continued favorable, and on April the 15th, the exit wound on the inner side of the thigh was closed by scabbing, followed by the cicatrization of the entrance wound on the outer side on the 24th. However, difficulty was experienced in walking on account of imperfect flexion of the knee joint. On May the 3rd, the patient was transferred to the Kure Naval Hospital, where by strict enforcement of bathing, shampooing, and active movements of the injured limb, the deranged action of the knee joint was gradually restored, so that on the 9th, he was able to flex the knee completely, and on the 17th, he returned to the service perfectly recovered.

258.—**Compound fracture of the right thigh with contused wound of the chest and arm**:—Y. Nihongi, aged 22, a stoker of the Hiyei, during the naval engagement of the Yellow sea, was working on No. 5 pump in front of the accountants' office, in the 4th division of the lower deck, when an enormous shell of the enemy exploded in the ward-room of the 5th division; and by some of the driving shell-fragments, he received a compound fracture in the middle of the right thigh, where the soft tissues were utterly mutilated and the femoral artery torn off, the femur smashed; and severe contused wounds on the right arm and the right side of the chest were sustained. He died on the spot owing to the copious hæmorrhage and shock.

259.—**Fracture of the right thigh with abrasion of the left forearm**:—I. Iwamoto, aged 23, one of gun-crew of the Itsukushima, during the battle of the Yellow sea, was passing behind the bow-gun in the fore part of the upper deck, when a hostile shell exploded, piercing through the port netting of the fore part; he was struck by some of the shell-fragments on the right thigh at the juncture of the middle and lower thirds, and received a blind wound running from its inner and ront aspect to the outer and lower part of the limb. The femur was broken obliquely at that part. Searching for foreign body a shell-fragment was recognised concealed under the skin over the blind end of the wound. The skin was cut open and an irregular triangular fragment of shell covered with linen was extracted. The shell-fragment weighed 18 grammes (See figure 13). And in the upper part of the outer side of the left forearm was found an abrased wound of the size of a 5 *rin* copper; both wounds were directly treated antiseptically, and the fracture of the femur fixed with Liston's long outside splint and the patient was, on the 21st, conveyed to the Hospital of Sasebo Admiralty. At this time, the wound of the left

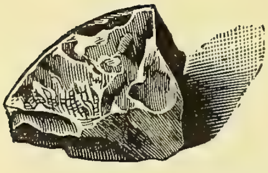
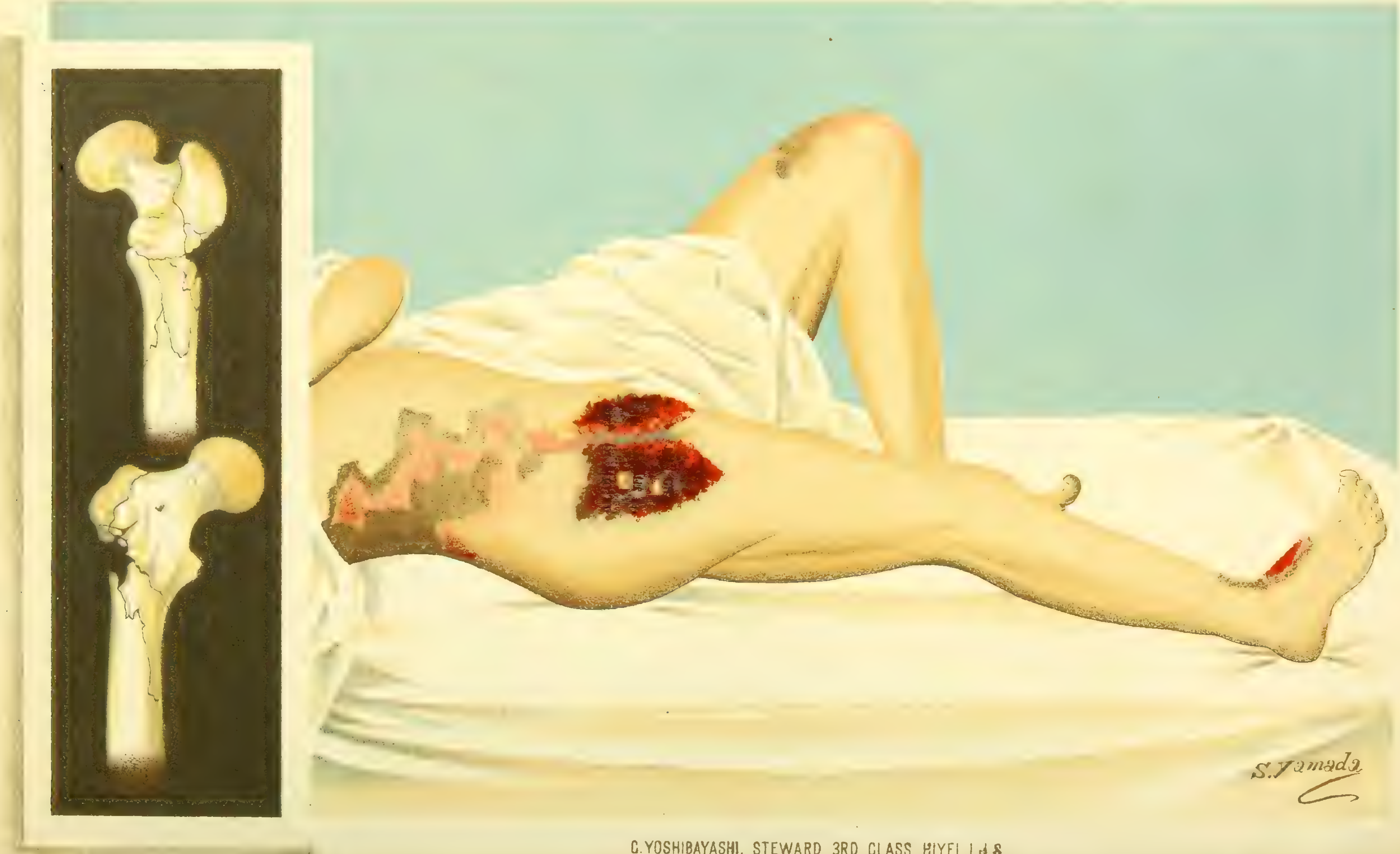


Fig. 13, Fragment of shell extracted from the wound of the right thigh (a piece of linen attached).

fore-arm was dried up, but that of the thigh had a slight discharge of pus, and on probing the wound there were three pieces of bone, which were extracted; then the right thigh was kept extended by weight. Progress was auspicious and on November the 6th, the wound had healed and the fracture united. On December the 10th, walking became normal and he returned to service.

260.—**Compound fracture of the right thigh with contused wound of the right shoulder**:—A. Yamazaki, aged 23, one of a torpedo crew of the Itsukushima, during the battle of the Yellow sea, was working in the torpedo-room in the fore part, when a hostile shell exploded, striking the torpedo net boom on the ship's side, and breaking through it, the fragments of the shell dashed into the said torpedo-room. By one of the fragments, he had the right thigh perforated from the front to the inner and lower part at the upper third, causing the rupture of the femoral vessels, and fracture of the femur (the wound on the anterior part was regarded as the entrance of the fragment, and was of an irregular square form, measuring 3 c. m. in diameter, the other wound appeared to be the exit and was rather smaller having the appearance of a rent); besides these he received a vertically lacerated wound 4 c. m. in diameter on the right shoulder. He died on the spot owing to hæmorrhage and the shock.

261.—**Compound fracture of the right thigh and the right hand with the burns of the lower half of the body**:—C. Yoshibayashi, aged 24, a cook on board the Hiyei during the engagement of the Yellow sea, was standing on the port side in the forepart of the upper deck as a carrier of the wounded, when a hostile shell came over the starboard waist netting, and exploded striking the stanchion of the port booms. His right hand was smashed off by one of the shell-fragments and he was immediately conveyed to the surgery in the ward-room at therear of the lower deck, and was undergoing a surgical operation, when a gain a 30.5 c. m. shell of the enemy exploded in that very room, and one of the fragments perforated his right thigh. By this catastrophe all the medical staff on board the ship were killed, so he was compelled then to receive a mere temporary dressing at the hands of his comrades, and on the next morning the ship having dropped anchor at the naval station near Cape Choppeki, he was properly treated by surgeons from other



C. YOSHIBAYASHI. STEWARD 3RD CLASS. HIYEI. I.J.S.

PERFORATING WOUND OF THE RIGHT THIGH WITH. FRACTURE OF THE FEMUR.

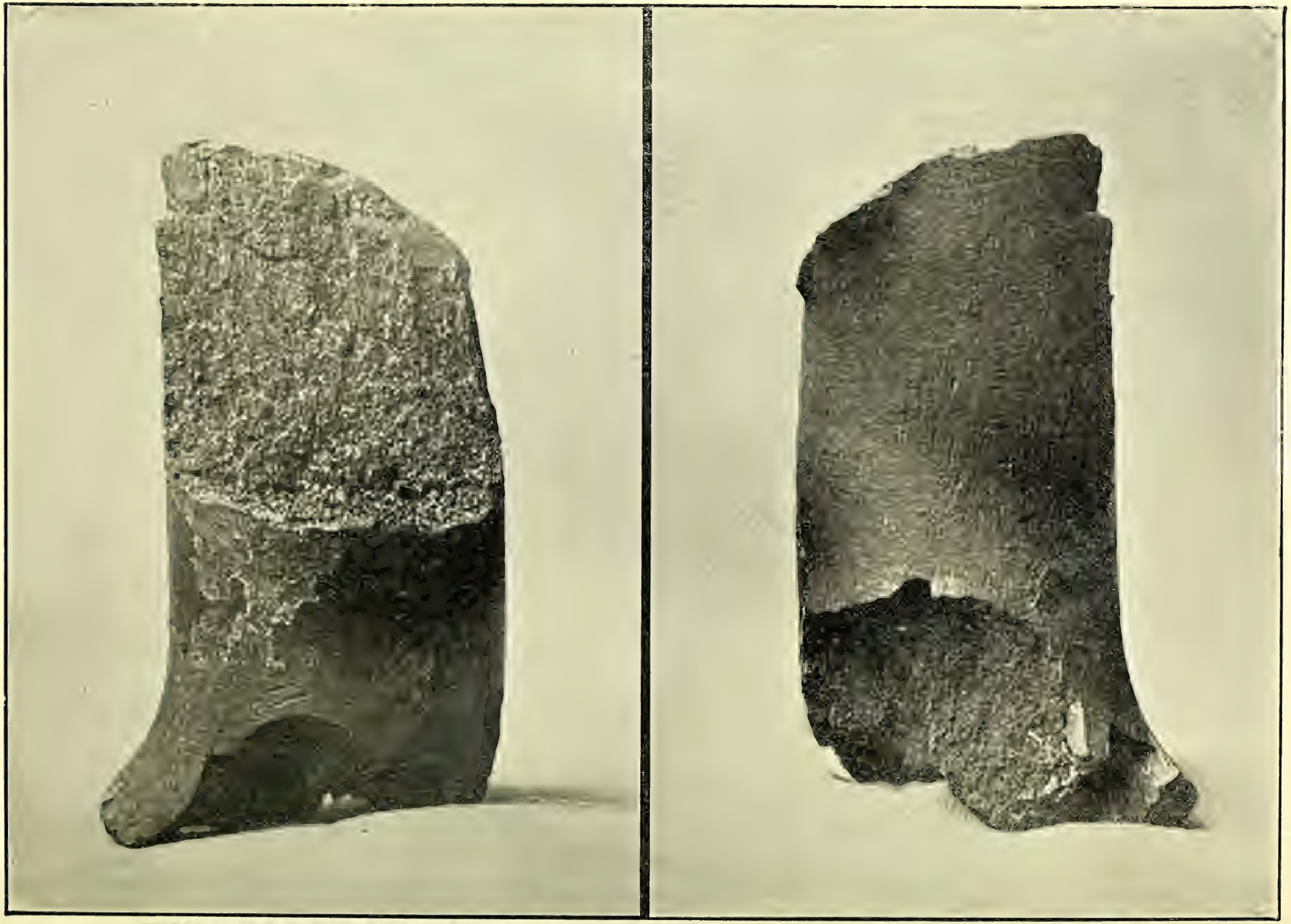
vessels. Conditions of the wounds : On the outer and front part of the right thigh, at the part 15 c.m. below the crest of ilium, was found a large wound of an irregular square shape, 13.4 c.m. long and 8 c.m. wide, and 4 c.m. apart from it downward and backward existed another wound almost of the same size. Both wounds communicated with each other beneath the skin which was as it were a bridge ; the margins of the wounds were mutilated into a ragged state, and the muscular substances were deeply severed, presenting a crater-like shape ; the femur was obliquely broken below the great trochanter and several pieces of broken bone were found inserted in the muscles. In the neighbourhood of the wound, the right lumbar region, the buttocks, back of the left thigh, and the left knee sustained burns of the 2nd degree, the right hand was mutilated at the wrist-joint and scarcely hung by the skin and muscles of the ulnar side. Bleeding was not severe from the beginning, and had entirely ceased by this time. After proper dressing, the patient was removed on board the transport Genkai-maru. On the 19th, the right fore-arm was amputated at its lower third by the circular method, and the flap was sutured. As to the broken right femur, its sharp ends were sawed away, and five pieces of broken bone were extracted from the wound at the same time, and dressed with sublimate gauze and fixed by Liston's long outside splints. To the burns oiled lint was applied. On the 21st, the patient was admitted to the Sasebo Naval Hospital. At this time, the wounds on the thigh presented a dark grey colour, the skin and muscles were sloughed and emitted an offensive smell. The sloughs were scraped off, and iodoform sprinkled ; attentions being specially paid to administration of tonics and nutritious diets. On the 28th of the same month : the skin spanning between the two wounds having sloughed, it was cut off, so that they were turned into a single wound. On October the 1st, the burns of the various parts healed, and the stump of the forearm performed the first union ; and the granulation in the wound of the thigh grew healthy emitting no longer an offensive smell. However, the periosteum of the lower segment of the broken femur was extensively stripped off, so as to extend almost down to the lower third of the thigh; the muscles around the bone had a baglike shape, in which pus was accumulating. The temperature rose to 38°C., and the symptoms of traumatic delirium set in. Thus conservative measures were hopeless, so on the 2nd, the thigh was amputated in its upper part, forming lateral flaps. The operation was finished in 30 minutes, but the patient soon showed signs of collapse. Immediately a subcutaneous injection of camphor and ether was administered, and brandy internally, besides hot bottles were applied to the limbs, but he succumbed two hours after the operation. (See the illustration)

262.—**Mutilation of both thighs**:—T. Fujita, aged 32, senior clerk of the Hiyei, during the engagement of the Yellow sea, was passing the front of the accountant's room on the port side of the 4th division, when an enormous shell from the enemy exploded in the wardroom of the 5th division, he was struck by a large shell-fragment, and had his thighs mutilated, and died on the spot owing to heavy hæmorrhage and the shock.

263.—B. Miyamoto, aged 26, one of gun-crew on board the Akagi, in the course of the battle of the Yellow sea, was firing No. 1 Q. F. gun on the starboard side of the bridge, when a hostile shell came in from the after part and burst against the support of the said gun. By the shock, he was thrown into the hammock-netting on the bridge, and at the same time had both thighs mutilated. He died on the spot the result of heavy hæmorrhage and a severe concussion.

264.—**Mutilation of both thighs with contused wound in the right temple**:—H. Matsumoto, aged 32, one of guncrew of the Tsukushi, during the bombardment of Zhih Island, on February 3rd, 1895, was standing by the right side of the funnel, when a hostile shell struck him on both thighs and mutilated them in the lower third. Also at the junction of the middle and upper third, in front of the right thigh was a lacerated wound 5 c. m. long on the surface, and reaching the femur in depth. The interior of the wound was large and hollow in form, in which was imbeded a piece of broken stanchion 13 c. m. long, and 7 c. m. in diameter weighing 1657.5 grammes. (the figure given here is necessarily smaller than the original being a photograph from it). Hæmorrhage was heavy. Besides this, on the right temple, a contused wound was found which measured 3 c. m. long and reached to the bone; the wound was ragged and gaping; the mind was dull, pulse weak, breathing short; the hæmorrhage was stopped and stimulant was given, but at 1.44 p. m. 25 minutes after the injury, the patient succumbed to the shock.

265.—**Mutilation of the right thigh**:—M. Miyamoto, aged 27, a member of the gun-cotton magazine of the Itsukushima, in the engagement of the Yellow sea, was working in the torpedo-room in the fore part, when a hostile shell exploded striking against the torpedo-net boom on the ship's side, one of the large fragments entered the torpedo-room, and breaking through the ship's side inflicted mutilation of the



H. Matsumoto, Leading Seaman. Pieces of stanchion extracted from the right thigh. (Showing both sides.)

right thigh at its upper third. He died on the spot owing to heavy hæmorrhage and the shock.

266.—**Mutilation of the left thigh and right leg**;—G. Nishidani, aged 26, a petty officer on board the Hiyei, in the battle of the Yellow sea, was carrying the wounded in the upper deck to the ward-room (surgery) in the after part of the lower deck, when a 30.5 c.m. hostile shell knocked through the starboard side of the stern and exploded in the surgery. By one of the shell-fragments, his left thigh and right leg were mutilated. He was killed then and there owing to heavy bleeding and the shock.

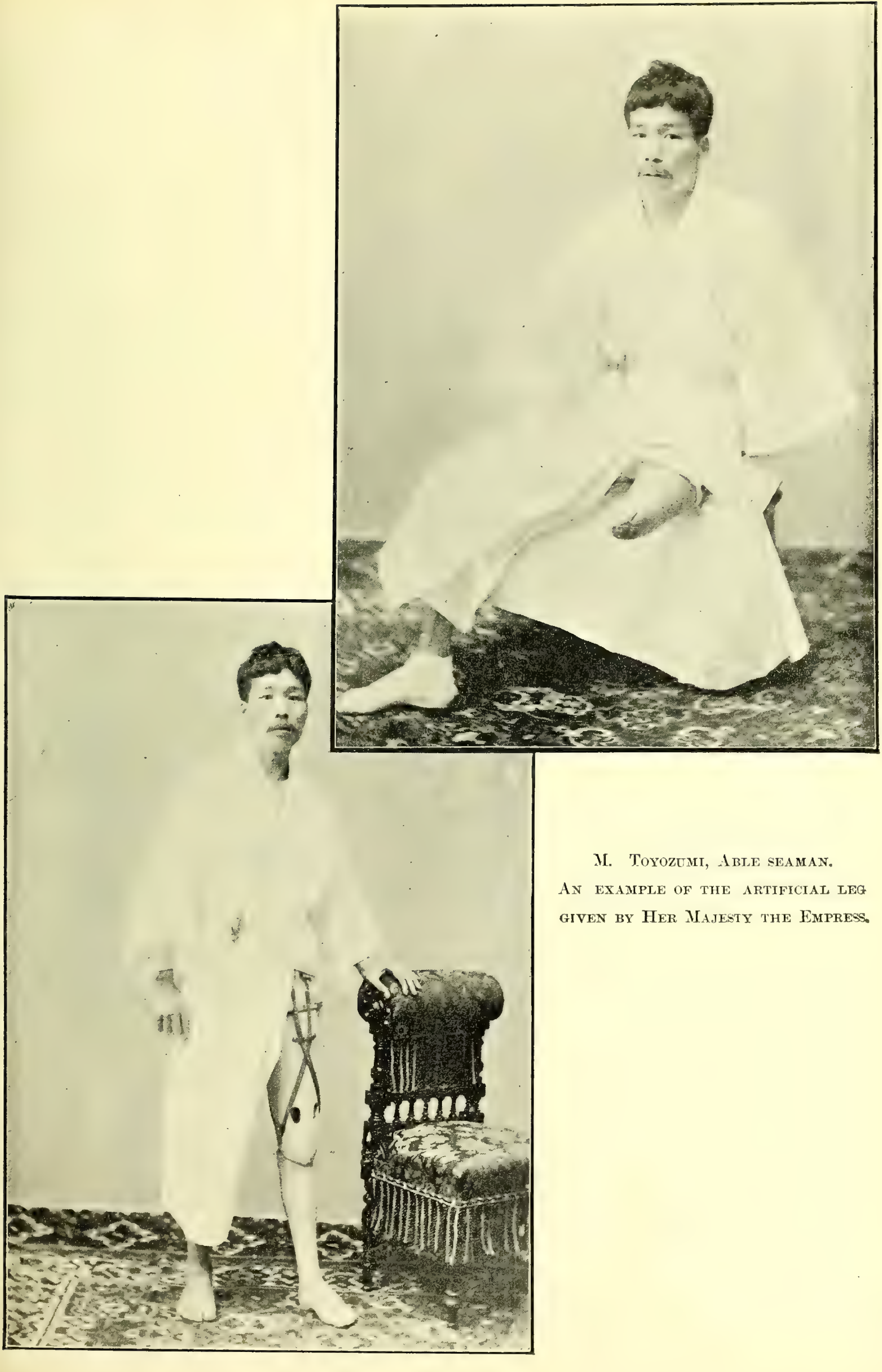
(C) INJURIES OF THE KNEE.

267.—**Contusion of the right knee**;—R. Tanaka, aged 24, one of gun-crew of the Yoshino in the course of the bombardment of Liukung Island, on February the 7th, 1895, was loading the shell of No. 6 12c. m. gun on the port side amidships, when a hostile shell hit the shield of No. 6 3 pounder and destroyed it. The broken pieces of the shield flew about and crushed No. 2 cutter together with the gear stowed away in it. He was struck by one of the wooden splinters on the right knee. A palm sized subcutaneous extravasation was present on the outer side of the joint, accompanied by swelling and pain, so that he was unable to walk. However, the joint was not injured. A bandage was applied to the part, and he was ordered to keep quiet. On the 8th, he was transferred to the hospital ship Kobe-maru. Examination on board the vessel, showed that the swelling was more aggravated than it had been the day before, and a wracking pain was complained of at the part on the outer sides of the knee-joint and the calf. Lead lotion was applied. In due course of time, the swelling subsided, and the subcutaneous extravasation was absorbed. On the 20th, the patient was conveyed to the Sasebo Naval Hospital. At this time, there still remained an induration in the injured part, which gave pain on pressure, but the extravasation was nearly absorbed, and the walking was not much interfered with. Spirit of camphor was applied and the part was covered by bandage. On March 5th, the patient left the hospital completely recovered.

268.—**Contused wound of the right knee and leg**;—O. Saito, aged 23, one of a gun-crew on the Yoshino, during the engagement of the Yellow sea, was firing the 3 pounder on the starboard quarter-deck, when a hostile shell exploded on the said deck after piercing the starboard netting. Some of the shell fragments inflicted two contused wounds on the right popliteal region ; the upper one was 5 c. m. and the lower 2 c. m. in length, both were of subcutaneous depth attended by a slight hæmorrhage. Also on the calf of right leg a subcutaneous extravasation was present. To the contused wounds of the knee sublimate gauze was applied and to the leg wet carbolic compress. On the 23rd he was removed on board a transport bound for home, and admitted to the Sasebo Naval Hospital on the 26th. At this time, the wounds of the popliteal space were slightly suppurating, and pain at the knee-joint gave him much difficulty in walking. The swelling and extravasation of the calf had not abated yet. The former treatment was continued. On the 30th the lower wound of the popliteal region formed scabs, and that day the patient was removed to the Kure Naval Hospital. In due course of time the swelling and extravasation on the calf subsided and the wounds of the popliteal region were healed by the beginning of November. However pain was still felt at the knee-joint on walking and, from about the 13th of the same month, a pain was felt at the ankle on the same side, with slight swelling after standing a long time. Tincture of iodine was painted over the part, and the limb kept in an iron-splint. On the 22nd he left the hospital perfectly recovered and returned to duty.

269.—**Contused wounds of the left knee and scalp with rupture of right tympanic membrane**:—K. Tawara, aged 35, Chief Surgeon on board the Saikyo-maru, in the battle of the Yellow sea, had finished his inspection of the preparations for the conveyance of the wounded and was going down the middle starboard hatch of the upper deck, when a 30. 5 c. m. shell entered from the starboard beam, pierced through the ward-room on the upper deck, passed about 3 feet from him, and exploded on the larboard side of the ward-room about 6 feet to his left. He was struck on the head by some of the scattering fragments of shell and splinters, and in addition, owing to the shock of explosion he was thrown down upon a step of the hatch, and received contusion of the left knee and rupture of the right tympanic membrane ; and his uniform was torn like rags.

Conditions of the wounds:—The injury on the head was a crescent-like contused wound, 3 c. m. long, extending over the left temporo-parietal suture. It was as deep as the periosteum and attended by a slight hæmorrhage, with but little pain. In the centre of the left patella a round contused wound, some 3 m. m. in diameter, was found, and by probing a depression on the surface of the bone was felt. Hæmorrhage and pain were not marked. Iodoform gauze was applied, and

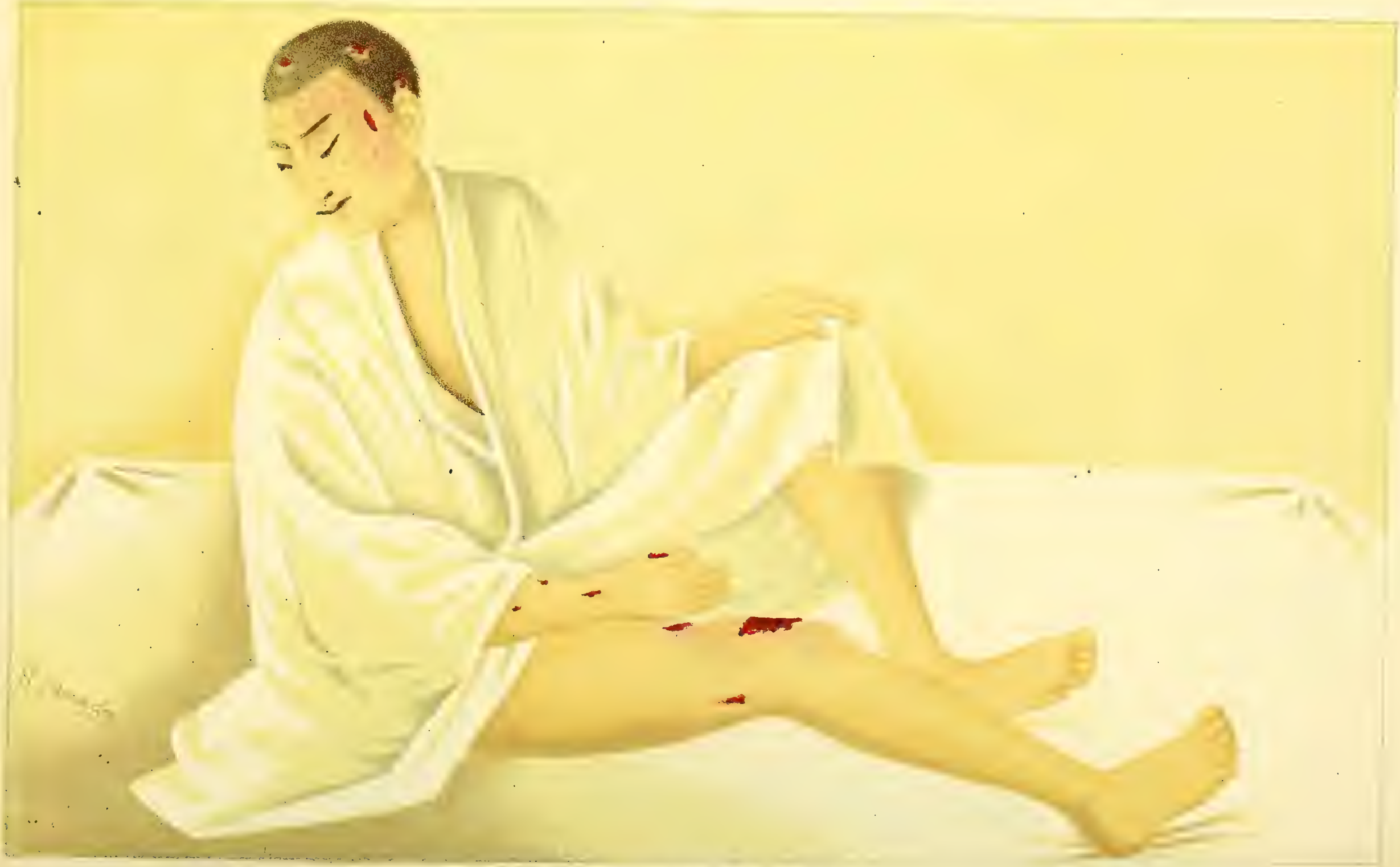


M. Toyozumi, Able seaman.
An example of the artificial leg
given by Her Majesty the Empress.

the right ear plugged with sterilized cotton, and the Surgeon went on duty again, but about 6 p. m., the left knee-joint began to swell and at about 9 p. m. the skin around became tense and heated, so that even slight movements could not be performed, and the temperature rose to 38°. 5C. The injured limb was put in a back splint and a cold solution of carbolic acid was incessantly applied. The wound on the head healed in 10 days without suppuration, and the rupture of the tympanic membrane in 3 weeks leaving an induration of the membrane and consequent dulness of hearing. The inflammation of the knee-joint gradually abated, and the wound contracted with a gradual return of movement. Tincture of iodine and bandages were applied, and on the 20th of November, though not fully recovered, he was able to resume his duty.

270.—**Compound fracture of the left knee joint with blind wound of the shoulder**:—M. Toyozumi, aged 29, one of the gun-crew of the Fusō, during the battle of the Yellow sea, was resting on the left side of the funnel-casing, when a shell pierced through the lower part of the funnel, and some of the iron-fragments struck the front of his left knee-joint, smashing the patella and the lower end of the femur. Some bleeding occurred but the popliteal artery was not injured. There was also a blind wound running upwards and outwards from the inner and lower part of the left scapula its margins were lacerated, and it measured 13 c. m. in depth reaching the posterior surface of the scapula. The bone was not injured. The wounds were sealed with antiseptic bandages. The patient's mind was normal, and he complained only of the pain, so morphine was injected hypodermically and he was ordered absolute rest. On the 18th, resection of the knee-joint was performed, and the part was kept on a splint. The blind wound of the scapular region was furnished with a counter opening and a drainage-tube was introduced. On the 19th of the same month the patient was taken on board a transport bound for home and reached the Sasebo Naval Hospital on the 21st. On the 22nd the wound of the scapular region showed auspicious signs attended with a slight escape of pus while that of the knee-joint discharged thin grayish pus, granulation was dull; a very offensive smell was emitted, and the part below the knee joint became cool and numb and as the tip of the oot was already turning a purplish color, and the bodily temperature had risen to 38°.7 C., it became evident that owing to the arrest of the circulation consequent to the injury of the popliteal artery, the leg had mortified. Accordingly amputation of the thigh at the lower third was performed by the oval method. On the 23rd the temperature fell to 37°. 6 C. On the 27th the temperature become normal, the canal of the wound of the scapular region developed favorable granulation, pus discharge was slight, the flap of the stump of the thigh united perfectly and by December 29th the wound of the scapular region had formed a cicatrix. On January 8th, 1895, the patient was transferred to the Kure Naval Hospital and on the 31st a sudden outbreak of fever set in and the amputated stump of the thigh presented an erysipelatous appearance. Ichthyol collodium was applied over the affected part and on February 3rd, the erysipelatous patches began to subside; on the 5th the temperature became normal, and on the 10th signs of erysipelas were all gone. In April, H. M. the Empress graciously conferred on him an artificial limb. On May 10th, he was discharged from the service for life and pensioned according to the regulations. (The artificial limb is shown in the illustration)

271.—**Penetrating wound of the right knee joint, and contused wounds of head, face and upper limb:**—W. Yamanouchi, aged 18, a seaman on the Yoshino, in the engagement of the Yellow sea, was passing the after part of the upper deck, when a shell pierced through the starboard netting and exploded together with the 12 c. m. shells placed in a row along the side of the ship. He sustained a slight burn on the face with grains of powder sticking into the skin, and the shell fragments inflicted many wounds:—small contused wounds, one each on the forehead, left parietal region and the left temple; a longitudinally lacerated wound over the left malar arch; three small contused wounds in the back of the lower third of the right forearm, an abrased wound on the back of the right wrist joint and a longitudinally lacerated wound, 3 c. m. long, between the thumb and index finger of the right hand; and a seriously lacerated wound on the knee-joint 5 c. m. long, running laterally just above the patella. The margins were lacerated in a serrated form; the quadriceps tendon being partly torn the joint cavity opened and the patella displaced downwards: a part of bone sustained fracture, so that the articular surface of the femur was exposed. However, both the femur and tibia were uninjured. The wound was searched and several tiny pieces of bone and a shell fragment were extracted. The wounds were all treated antiseptically, and the limb kept at rest on a splint. The patient was taken on the 19th on board a transport, and admitted to the Sasebo Naval Hospital on the 21st. By that time, the burn of the face was found already healed, and almost all the other wounds on the head, face and arm had developed granulation without suppuration. But the wound of the knee-



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joint discharged pus, and had a dirty looking surface. The conjunctiva of the left eye was also congested attended with pain. On examination a small iron fragment was found at the outer part of the conjunctiva and removed directly. On the 22nd, the dressing of the knee was changed, pus was discharged copiously, in the evening the temperature rose to 38°C., so a counter-opening was made on the outer and inner side, and a drainage tube introduced. On October 3rd the wounds on the head, face and the right forearm were healed, and those on the back of the hand had become small owing to the development of granulation. The wound of the knee had developed granulation, so that the cavity of the joint was closed, the pus discharge nearly ceased, and the temperature became normal. On November 9th both wounds on the back of the hand were cured, and the wound of the knee had entirely closed. As the general health had become somewhat impaired a mixture of quinine and iron was administered internally. Progress continued to be favorable, and by February 20th, 1895 he was entirely healed, but the knee-joint was stiff, so local hot bathing and passive exercise were ordered On May 3rd, the patient was transferred to the Kure Naval Hospital, his stiff knee joint found hopeless; and he was dismissed from the service for life. He left the hospital, and was pensioned according to regulations. (See illustration)

(D) INJURIES OF THE LEG.

272.—**Contusion of both legs**:—H. Tokumaru, aged 24, a petty officer on the Fusō, in the course of the bombardment of Zhih Island, was on the step of the starboard ladder of the forecastle, when a shell came through the gallant forecastle and burst. Some of the flying shell fragments inflicted the following injuries:—A contused wound at the middle of the inner side of the right leg, the part was somewhat swollen owing to a small subcutaneous extravasation; at the middle of the inner border of the right foot, a contusion some 3 c. m. square, with swelling and subcutaneous extravasation; another small extravasation at the lower part of the front of the left leg. As the injured man was unable to walk, he was ordered to rest, and the parts were dressed with solution of acetate of lead. In due course of time, the abrased surfaces healed, the swellings disappearing at the same time. He was perfectly cured on the 15th of the same month.

273.—**Contusion of the left leg**:—B. Nishioka, aged 30, one of the gun-crew belonging to the Yoshino, in the attack on the eastern forts of Liukung Island, was standing by the No. 6 12 c. m. gun in the larboard waist, when a shell hit the shield of No. 6 3 pounder. One of the shield fragments wounded him on the outer side of the left leg, causing a subcutaneous extravasation with swelling and pain, but without injury to the bone and no hindrance to walking. The injured part was dressed with wet carbolic gauze. By the 10th of the same month, the extravasations of the parts became absorbed, leaving yellowish patches, and the swelling and pain having disappeared, the wound was healed.

274.—**Abrased wounds of both legs**:—J. Kodama, aged 26, one of the gun-crew of the Fusō, in the battle of the Yellow sea, was firing from the starboard fort in the waist of the upper deck, when a shell struck the iron-pillar on the larboard side of the upper deck and broke it. Some of the flying fragments of the shell and iron, inflicted several small abrased wounds on the outer sides of the right and left legs. Sublimate gauze was applied. On the 26th following, the wounds were healed by scabbing.

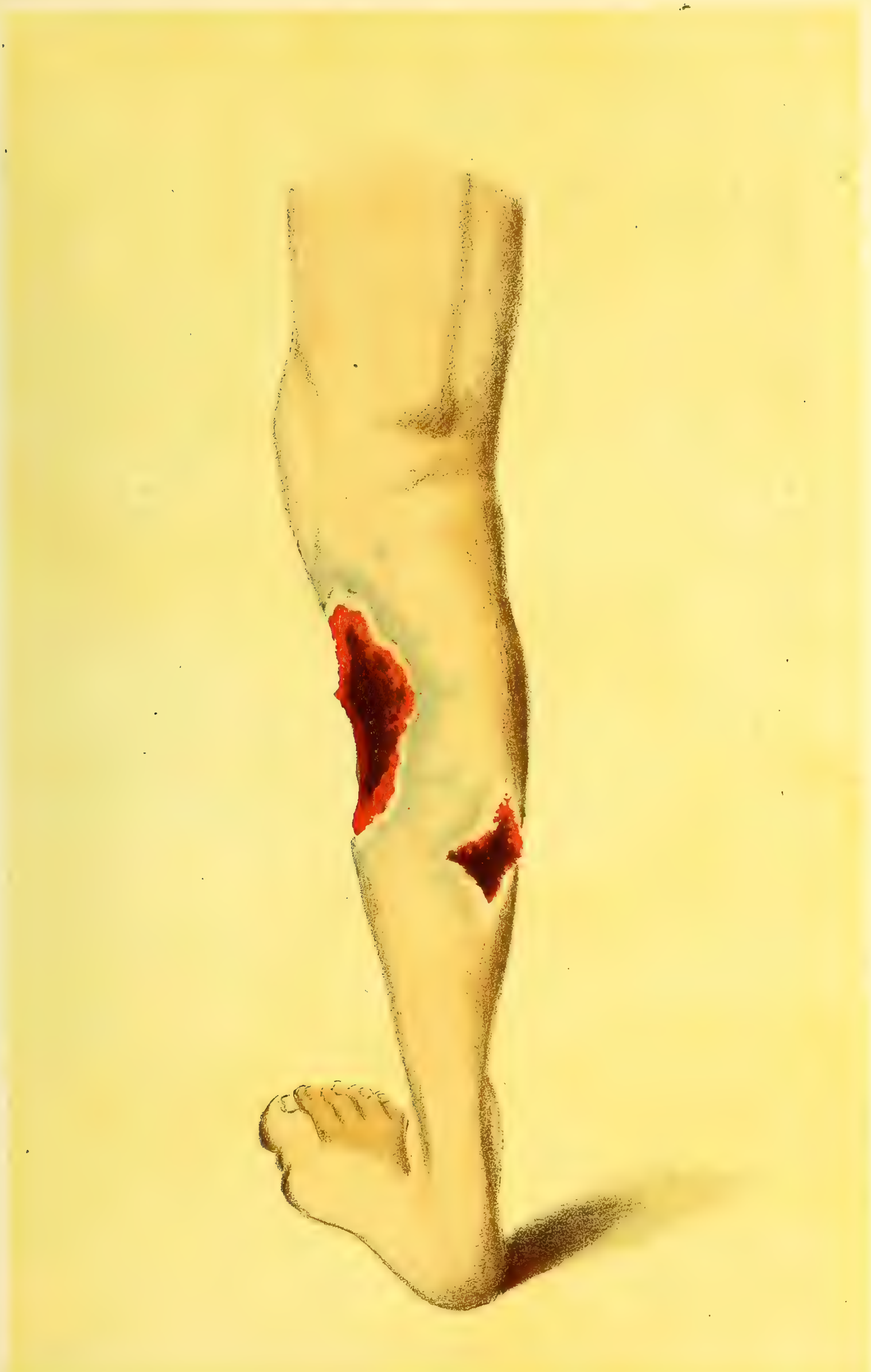
275.—**Abrased wound of the left leg**:—S. Numahata, aged 26, a seaman belonging to the Saikyo-maru, in the battle of the Yellow sea, was posted as a crew to the 47 m. m. Q. F. gun, on the port bow of the upper deck, and was firing at a torpedo-boat, when a shell came from the starboard side and smashed the derrick of the fore-mast. One of the wooden splinters inflicted a wound on the right leg. On examination, an abrasion of skin 3 c. m. long in the middle of the front of the leg was found but no lesion of the bone. Carbolic gauze was applied, and the wound had healed by the 20th following.

276.—K. Doi, aged 20, a seaman on the Tenryu, in the course of the bombardment of the eastern fort of Liukung Island, was, standing forward of the booms on the starboard fore quarter of the upper deck, when a shell from the enemy exploded after striking the gear of the No. 2 port gun, and a piece of iron inflicted an abrased wound, 3 c. m. across, on the inner side at the lower third of the left leg. The part was directly dressed with sublimate gauze. It was perfectly healed on the 19th following.

277.—**Contused wound of the right leg**:—H. Nishikawa, aged 25, one of the gun-crew of the Katsuragi, in the course of the attack on Liukung Island, was struck by some wooden splinters produced by a hostile shell and received a longitudinally lacerated wound about 3. 5 c. m. long, at the middle of the right calf, which was found to be as deep as the subcutaneous tissues. The back of the right knee-joint also was somewhat swollen accompanied with pain. The wound was dressed with sublimate gauze, and the patient was ordered to rest. To the back of the knee lead lotion was applied. By the 26th following, the swelling of the knee had entirely subsided, so that he could now walk freely but the lacerated skin of the wound on the calf turned grayish black in a sloughing condition, with pus discharge from the bottom. The former dressing was replaced by wet carbolic bandage. By March 10th, the skin had sloughed off, the surface of the wound cleaned and the pus discharge ceased. Iodoform was sprinkled on; and on April 2nd, the wound was perfectly healed by cicatrix.

278.—**Contused wound of the left leg**:—S. Takarabe, aged 27, a gunner of the Tsukushi, in the course of the attack on the eastern forts of Zhih Island, was standing behind the machine gun, in the port waist of the upper deck, when a shell came from the port side and pierced through the lower part of the funnel. One of the iron fragments inflicted a contused wound 3 c. m. long 1 c. m. wide running laterally 8 c. m. above and behind the external malleolus of the left leg. The skin and muscles were found lacerated, with irregular margins and its depth reached to the fibula, attended by profuse hæmorrhage. The bleeding was stopped, the foreign body extracted, and the wound dressed with sublimate gauze. On the 5th following, the patient was taken on board the transport Yedo-maru; and admitted to the Sasebo Naval Hospital on the 10th. At the time, the wound was still so deep as to allow the insertion of the index-finger which could touch the periosteum of the fibula, there was also a great discharge of pus. In March, granulation developed so as to fill the wound, and at the end of the month the wound cicatrized. But owing to the adhesion of the cicatrix to the fibula, and consequent pressure of the part, the dorsum of the foot developed a slight swelling, but without pain. By the use of local hot bathing and massage, it gradually subsided, and on May 3rd, he returned to duty, perfectly healed.

279.—**Lacerated wound of the right leg with perforated wound of the left thigh**:—H. Ono, aged 21, a signalman on the Matsushima, in the course of the engagement of the Yellow sea, was in the waist of the flying-deck engaged in signalling, when a hostile shell exploded on the said deck. Some of the shell fragments inflicted a wound with loss of substance on the right calf, and a perforating wound at the lower part of the left thigh. Conditions of the wounds:—Both the skin and muscles on the back of the right leg, were so mutilated that only the deep muscles were left, the wound was 18 c. m. in the vertical, and 12 c. m. in the transverse diameters. However, the posterior tibial artery fortunately escaped injury, so hæmorrhage was not serious, and no fracture occurred. As to the left thigh, there was a lacerated wound 4 c. m. above the knee-joint on the inner side of the lower fourth, and some 3 c.m. above the knee-cap; and just in front of this wound there was another lacerated one about 3 c. m. in size. They had communicated under the skin. Examined at the Sasebo Naval Hospital on the 20th of September, the wound of the calf was suppurating, the severed ends of the gastrocnemius presented gangrenous conditions, and pain was so severe that sound sleep could not be obtained. The wound was washed with 3% solution of carbolic acid, and bandaged, a dose of morphine powder was given, and the bandage was changed daily. By the 25th, the pieces of flesh in the wound on the calf had nearly all sloughed off, so that the part became somewhat clean, yet the pus discharge was still copious and attended with pain. A mixture of brandy and an infusion of cinchona bark was administered internally. On the 28th, the temperature rose a little, and the patient complained of headache and a dull pain all over the body. On examination the wound was found to be progressing favorably, the sloughs having all come off and pus discharge greatly decreased. The bandage was changed and a dose of quinine was prescribed with an acidulated drink. On October 9th, the temperature became normal and the canal of the perforated wound in the lower part of the left thigh had filled up and only presented two small granulating surfaces. The wound of the calf developed auspicious granulations with but little pus discharge. The bandage was changed every other day, and a mixture of iron and quinine administered internally. By November 17th, the wound of the left thigh had healed, forming scabs, and that of the calf had contracted so that it cicatrized by January 15th of next year. The knee-joint on the injured side became ankylosed at an angle of about 150°, and the part below that cicatrix was found slightly œdematous attended with numbness. This was probably due to the pressure caused by the contraction of the cicatrix. Local hot bathing, friction with spirit of camphor, and massage were perseveringly carried on. Though the œdema gradually subsided, the injured limb became much emaciated and the numbness was not perfectly cured, and, on standing, pain was felt in the affected limb, so that the patient could not walk without a stick. On April 19th, he was dismissed from service for life and pensioned according to the regulations.



R. WAKITA. ABLE SEAMAN."MATSUSHIMA." I.J.S.
PERFORATING WOUND OF THE RIGHT LEG.

280.—**Blind wound of the right leg with abrased wound of the left leg**:—M. Shimizu, aged 18, a stoker on the Itsukushima, in the battle of the Yellow sea, was in the after boiler-room, when a shell pierced through the coal bunker in the starboard waist, and exploded against the ladder set at the middle step of the said room. Some of the shell-fragments inflicted a blind wound on the outer and back part of the right calf. It was a vertical lacerated wound 3 c. m. in length, and half as large across. There was also a small abrased wound in the middle of the front of the left leg. The injuries were simply dressed on board the ship, and the patient was admitted to the Sasebo Naval Hospital on the 21st. The wound on the calf was then found to measure 9 c. m. in depth, and a shell fragment the size of a plum seed was found at the bottom and extracted. (see Fig. 14) A drainage tube was introduced and an antiseptic bandage applied. At this time, the abrased wound on the left leg had healed. On the 30th, he was transferred to the Kure Naval Hospital where the canal of the wound filled with granulation, and a cicatrix formed, by October 20th. He was discharged, perfectly cured, on the 24th, and returned to service.

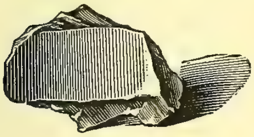
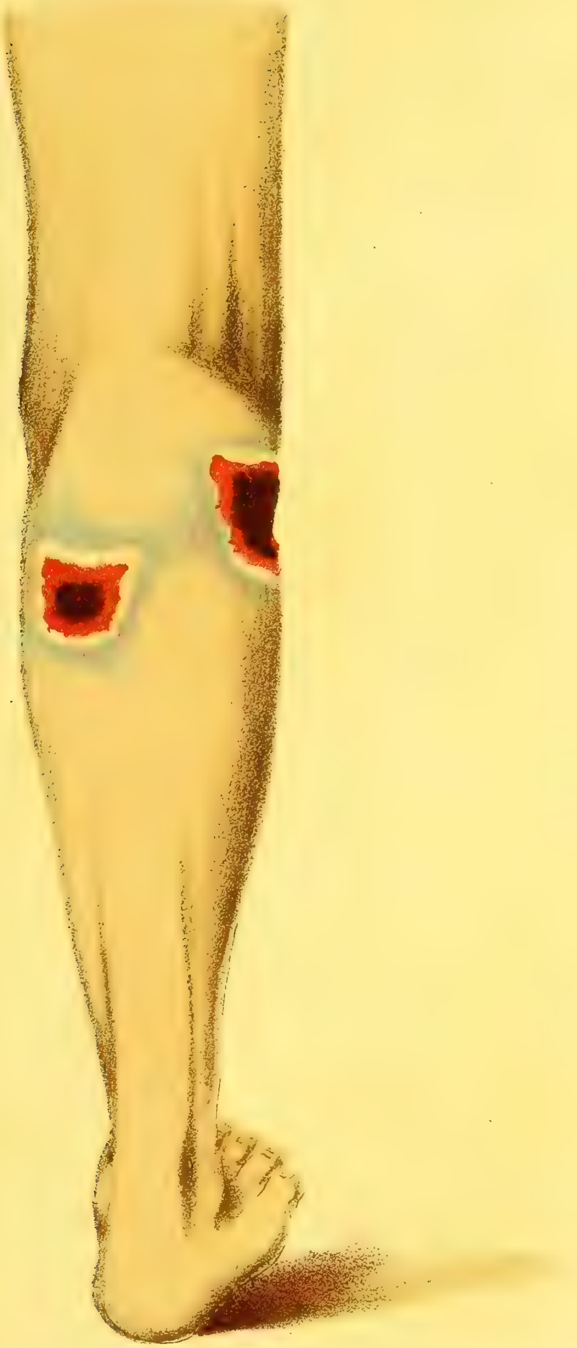


Fig. 14
Shell fragment extracted from the wound of the right leg.

281.—**Blind wound of the left leg**:—T. Nakagawa, aged 36, a signal-man on the Akagi, in the engagement of the Yellow sea, was at work on the bridge, when a musket ball hit his left leg. On examination a round wound 6 m. m. in diameter on the inner side at the lower third of the left leg was found. The canal of the wound took a forward course with a depth of about 1 c. m. yet not reaching the bone; hæmorrhage was not severe but there was a good deal of pain. The ball was a conical one of 11 m. m. diameter, perhaps a Gatling bullet. The wound was dressed antiseptically, and he returned to duty. Next day, when the bandage was changed, the margins of the wound were inflamed, the former dressing was continued, and on the 20th the inflammation around the wound subsided, progress was favorable, and the wound was perfectly healed on October 8th.

282.—**Perforating wound of the right leg**:—R. Wakita, aged 23, a member of the torpedo-crew of the Matsushima, in the battle of the Yellow sea, was on duty in the torpedo-room in the starboard waist, when fragments of a 30.5 c. m. hostile shell that had burst in the fore part of the lower deck entered the said room breaking though the bulkhead. One of the fragments inflicted a perforating wound on the right leg. (The injured man said about the course of the bullet that it lightly touched the left side of the forehead, the tip of the glans penis, pierced the leg from the inner to the outer side and at last fell on the deck). Conditions of the wound :—On the inner side of the upper fourth of the leg, an irregularly lacerated oval hole 15 c. m. in diameter was found which went through the calf forming a lacerated exit 7 c. m. long and 4 c. m. wide on the back of the middle part of the leg. The wound was temporarily dressed on board the ship and the patient was admitted to the Sasebo Naval Hospital on the 20th. On inspection, a slight hæmorrhage was found which moistened the bandage, but the bleeding had never been severe. A drainage tube was introduced and an antiseptic bandage applied. On October 30th, as the canal of the wound had grown narrow by favorable granulation, the drainage tube was replaced by carbolic gauze. By November 13th, communication between the outer and inner apertures was closed owing to the union of the middle part of the canal. On February 20th, a cicatrix formed. Afterwards, owing to the contraction of the cicatrix, the dorsum of the foot on the injured side swelled slightly, and there was some pain at the cicatrized part. Warm bathing, friction with spirit of camphor and massage were resorted to, and, by the middle of March, the swelling and pain of the leg entirely disappeared, and the patient could walk easily. On the 14th of the same month, he was, completely recovered and returned to service. (See the illustration).

283.—F. Haruki, aged 25, one of a gun-crew on the Yoshino, in the course of the bombardment of the eastern forts of Liukung Island, was standing by No. 6 12 c. m. gun in the port side amidships, when a shell hit the shield of No. 6 3 pounder. One of the fragments of the broken shield, inflicted a perforating wound at the part between the upper and middle third. The wound on the inner and back part was irregularly lacerated in a crescent-like form measuring 3. 3 c. m. long and 2. 7 c. m. wide, and that on the outer side was of an oval shape 6 c. m. in length and 5 c. m. in breadth. It seemed that the one on the outer side was the entrance and the inner the exit. On examining the wounds, no important structures were injured. A drainage tube was introduced, a corrosive gauze applied and the patient was ordered to keep quiet. At night he complained of severe pain, which was alleviated with a dose of morphine. Temperature was 37°. 8 C.; next morning, the dressing was soaked with bloody serum, which was accordingly changed. The same day he was removed to the hospital ship Kobe-maru. On the 10th, the lacerated portions of the



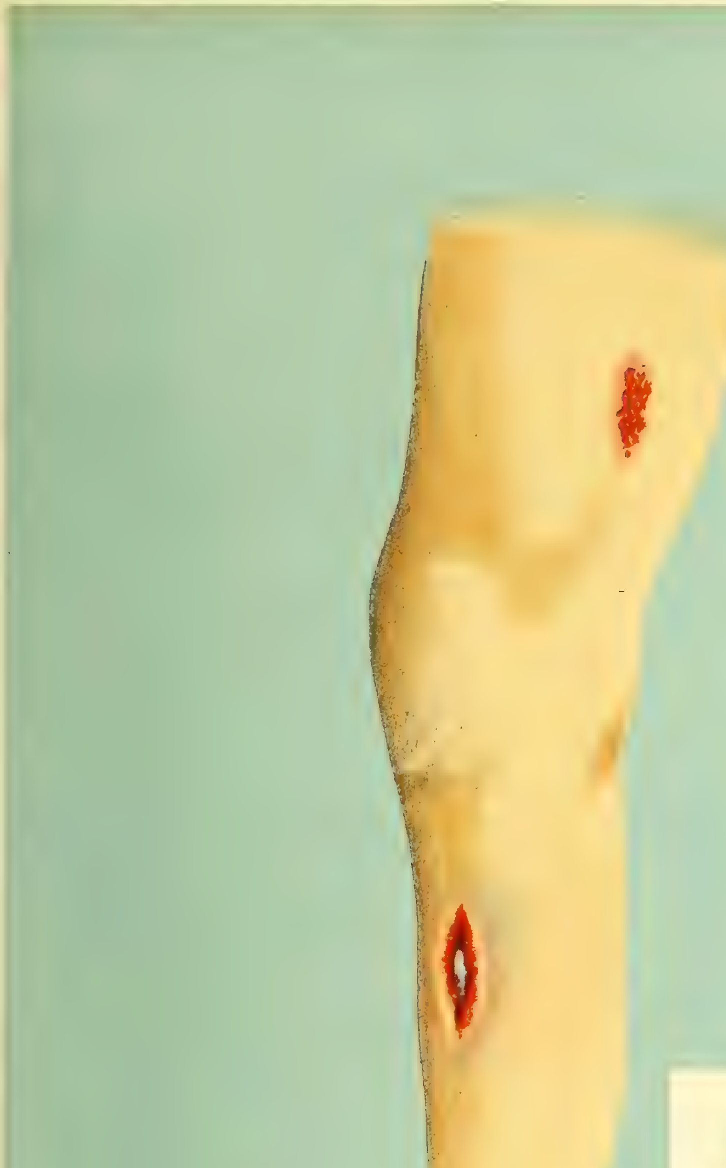
F. HARUKI, ABLE SEAMAN "YOSHINO" I.J.S.
PERFORATING WOUND OF THE RIGHT LEG.

skin and muscles at the wound-apertures sloughed, and pus escaped out of the canal, the temperature fluctuating at 38°. 5 C. The dressing was daily renewed, and the patient was on the 20th admitted to the Sasebo Naval Hospital. Examined at the hospital, the sloughs having almost entirely come off, the margins of the wounds were found to be clean; but the apertures of the wound had become somewhat larger than they had been at the time of injury, and pus was discharged from both apertures. The wounds were washed with solution of carbolic acid, a drainage tube introduced, and an iodoform bandage applied. On the 28th, the pus discharge decreased, and healthy granulation developed; the canal became gradually narrower, so the drainage-tube was replaced by gauze. By March 10th, the canal filled with granulation and the communication between the entrance and exit wounds was closed. On April 2nd, the wound on the inner side of the leg formed scabs, while that on the outer still retained a very small granulating surface. Nutrition of the body was somewhat impaired and slight symptoms of anæmia set in, so a mixture of quinine and iron was internally given. By May 3rd, the wound was almost healed, but on walking, a pain of a stretching nature was felt in the leg. This day the patient was transferred to the Kure Naval Hospital. Progress continued favorable, and the patient left the hospital on June 16th, completely recovered, and returned to service.

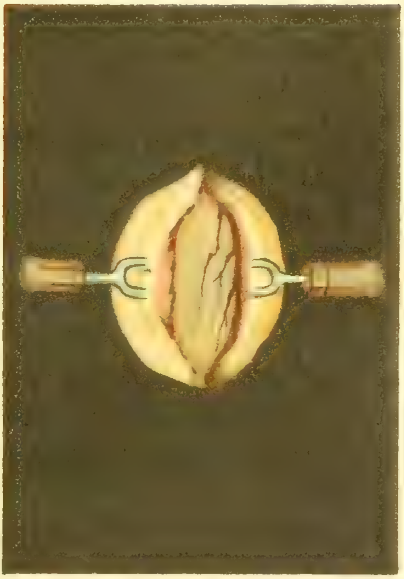
284.—**Simple fracture of the right fibula with contusion of the right forearm**:—M. Ogasawara, aged 21, a seaman belonging to the Hiyei in the course of the engagement of the Yellow sea, was standing at the post of relieving tackle in the cabin on the lower deck, when an enormous shell exploded in the next ward-room, and smashed the partition of the said room and the deck. He was struck by some of the scattered wooden splinters and received contused wounds on the right forearm and hand, and on the outer side of the right leg. As all the medical staff on board the ship were killed by the same explosion, he was temporarily dressed by his comrades, and was properly treated by a surgeon from another ship the next morning, when the vessel arrived at the rendezvous near Cape Choppeki. On examination, on the outer side of the upper third of the right leg, was found a subcutaneous extravasation, where it was somewhat swollen, and gave severe pain, especially in the deeper part on pressure. Crepitation felt at the neck of the fibula evinced the fracture of that bone. Also there existed pain and slight swelling at the outer side of the middle of the right forearm, and at the roots and backs of the middle and ring fingers, though without any lesion of the bone. A splint was applied to the right leg, spirit of camphor to the contused wounds on the forearm and hand, and the patient was ordered to keep quiet. On the 26th, he was admitted to the Sasebo Naval Hospital. At the time, the contused parts of the forearm and hand were found to be healing gradually, but as the swelling over the fractured part of the leg was still lingering, it was fixed by plaster of Paris bandage. On the 30th, he was transferred to the Kure Naval Hospital. Progress was afterwards favourable, the fracture of the fibula united, and the pain and swelling disappeared. On October 25th, the patient was perfectly recovered, and returned to service.

285.—**Contused wound of the right leg**:—(with superficial lesion of tibia) Y. Hirai, aged 23, one of a gun-crew on the Akitsushima, during the attack on Liukung Island, February 7th, 1895, under a command to stop firing, was standing just behind the No. 7 gun on the starboard after-quarter of the upper deck, when a hostile shell burst on the poop-deck. Some of the shell-fragments inflicted two small contused wounds, one just below the tubercle of the right tibia and the other in front of the middle part of the right leg. The upper one though piercing the periosteum and reaching the bone did not cause fracture. The wounds were dressed antiseptically, and the patient was ordered to keep quiet. On the 8th, he was removed to the hospital ship Kobe-maru. On the 13th, the wound at the middle part of the leg was nearly healed, while the one above it gradually developed granulation. On the 20th, the patient was admitted to the Sasebo Naval Hospital. The wound continued to discharge a little pus, but under antiseptic treatment granulation became healthy and the margins of the wound gradually formed epidermis, and a small cicatrix appeared on March 20th, and on the 25th, he left the hospital, perfectly recovered, and returned to duty.

286.—**Compound fracture of the right tibia with abrasion of buttock and thigh**:—K. Yotsumoto, aged 24, Midshipman on the Tsukushi during the bombardment of the forts of Zhih Island, February 3rd, 1895, was stationed, as assistant to the lieutenant of the 3rd division, in command of the 9 pounder on the starboard fore quarter of the upper deck, when a shell entered from the port side, and pierced through the lower part of the funnel. From some of the broken pieces of the funnel, he received the following wounds:—A vertically lacerated wound 3 c. m. long, at a part 7 c. m. below the knee on the inner side of the right leg, which tore the skin and muscles raggedly; and the wound was gaping. It reached to the tibia causing a



K. YOTSUMOTO. MIDSHIPMAN. TSUKUSHI I.J.S.
CONTUSED WOUND OF THE RIGHT LEG WITH FISSURES OF THE TIBIA.



SHWOING THE TIBIA

longitudinal fissure in its inner surface and attended by hæmorrhage. There was also a longitudinal abrased wound 3 c.m. long on the inner side about the middle of the right thigh, and a third, one c. m. long running laterally in the left gluteal region,—that is, 5 c. m. backward from the anterior superior spine of the left ilium. Carbolic gauzes were applied to the wounds. On the 5th, the patient was placed on board the Omi-maru, homeward bound, and on the 10th, reached the Sasebo Naval Hospital. Conditions of the wounds:—The margins of the wound on the right leg were swollen with the vesicles around, (perhaps owing to the irritation of carbolic acid); the wound was gaping and there was a slight discharge of pus. The abrased wounds on the thigh and gluteal region were already healed. Temperature was 37° C., the wound was treated with solution of corrosive sublimate and gauze, and the injured limb was kept on an iron splint. On the 14th, in the interior of the wound of the leg, free pieces of broken bone were found, which were extracted after enlarging the wound, and proved to be two fragments of bone. On the 16th, the swelling around the wound had entirely gone, and granulation presented a healthy colour, pus discharge became slight and the temperature normal. On the 27th, the granulation of the wound developed so as to fill the inside and cover the roughened surface of the bone. On March 12th, the patient was affected with intestinal catarrh, which was, by use of an astringent mixture, cured in a week. The conditions of the wound were daily improving, and by the middle of April, the wound had become contracted, the granulation developed to the level of the skin and pus discharge entirely ceased. Boracic ointment was applied. On May 1st cicatrix formed, and on the 5th, the patient completely recovered and returned to service. (See the illustration).

287.—**Fracture of the left tibia and fibula with abrasion of the back.**—M. Furubayashi, aged 25, a gunner on board the Akagi, in the battle of the Yellow sea, was firing from the starboard fore quarter on the upper deck, when fragments of a shell passing under the shield of that gun struck him, inflicting a flesh wound near the lower part of the right scapula and on the back of the left leg. On examination, there was an oval-shaped abrased wound 3. c. m. in diameter, at a part 6 c. m. below the inferior angle of the right scapula; there was no injury to the ribs; in the middle of the posterior surface of the left leg a lacerated wound 8 c. m. long 1. 2 c. m. wide, running in an inward and downward direction was found. The gastrocnemius was abrased, but as the margins of the wound were acutely cut, hæmorrhage was not heavy. An antiseptic bandage was applied. The patient was, on the 19th, removed on board a transport and admitted to the Sasebo Naval Hospital on the 21st. At that time, the surface of the wound over the lower part of the scapula had developed granulation attended by slight discharge of pus, while the wound of the calf had begun to suppurate, and the margins were inflamed. Carbolic lotion and an iodoform gauze were used. On the 30th, granulation was healthy in each wound, pus discharge slight, especially with the injury near the lower part of scapula, which had almost dried, and the same day he was transferred to the Kure Naval Hospital. The wound of the scapula quickly healed, but the margins of the wound on the calf produced vesicles on account of the irritation of the iodoform and became ulcerated. Accordingly on October 2nd the part was dusted with dermatol and a dry corrosive gauze applied, and after a few days the vesicles dried. On the 14th, wound on the calf was found to have a canal measuring 6 c. m. in a forward and downward direction, out of which bloody-pus was escaping, and a hard body was felt at the bottom. By means of forceps a square shell fragment 2 c. m. in diameter was extracted. As the fragment had been inserted between the tibia and fibula, the shafts of the bones were broken and small fragments of the bones were extracted, a drainage-tube introduced and an antiseptic dressing applied. At night the temperature rose to 39° C., and pain was felt in the injured part. On the 15th, the dressing was changed, and all the appearances of the wound were auspicious. On the 16th, the temperature fell to normal and the pain left, but pus discharge was copious, so a wet carbolic gauze was applied. On the 25th, the vesicles around the wound were healed, the granulating surface became small and shallow; discharge greatly decreased, so the drainage-tube was replaced by gauze. By November 10th, the granulation of the wound had grown to the level of the surrounding skin, the epidermis had newly developed along the margins of the wound and there was no discharge. Boracic ointment was applied. On the 30th the patient had completely recovered and rejoined his ship.

288.—**Compound fracture of the right leg with contused wounds of the head and thighs and burns of the face**:—S. Kato, aged 27, a nurse on board the Hiyei, in the engagement of the Yellow sea, was assisting in attending to the wounded in the surgery near the stern on the lower deck, when a 30. 5 c. m. shell entered after piercing the starboard side, and exploded against the mizzen-mast. By some of the shell-fragments, he sustained injuries on the head, face and legs.

As all the medical staff on board the ship were killed at the same moment, he had to be temporarily dressed by his comrades, and was attended to properly by a surgeon from another ship, when the vessel arrived at the rendezvous near Cape Choppeki next morning. On examination there were :—A lacerated wound 5 c.m. long reaching the periosteum, running obliquely over the centre of the parietal region; a lacerated wound, one inch in diameter, below the left mastoid process; a round patch of extravasation 5 c.m. in diameter in the left temple; several wounds, with loss of substance, in the lower third of the right thigh; a perforating wound in the upper third of the right leg, in which both the tibia and fibula sustained compound fractures, involving the knee-joint; a large, deep wound with loss of substance on the left thigh, just above the patella; the whole face sustained burns and was blackened by powder. The wounds were washed with carbolic lotion followed by antiseptic dressing. The lower limbs were put on splints, and the patient was removed to the transport Genkai-maru. No changes were noticed that day, but on the 19th, the temperature rose to 37°. 5 C., and the dressings were changed. The same day the transport sailed for home, and on the 20th, traumatic delirium set in and the patient complained of extreme pain, the temperature rose to 39 C., and the right leg became gangrenous, so amputation was performed that night, at the middle third of the right thigh. On the 21st, the temperature was 38°. 4 C., pulse 106. The mind seemed to be clearer than the preceding day, but at about 10 in the forenoon the cerebral symptoms set in, and at 11 the patient died.

289.—**Mutilation of both legs and the left forearm** :—M. Takenouchi, aged 25, one of the torpedo-crew of the Matsushima, in the engagement of the Yellow sea, was at work in the middle torpedo-room, when a shell entered through the port side and hit him, inflicting mutilated wounds on the left forearm and the left and right legs. Hæmorrhage was copious. The wounded man was at once carried to the forward surgery on the upper deck, as the surgery on the lower deck had been destroyed. While he was being attended to, a 30. 5 c. m. shell exploded in the forepart of the lower deck and the shock of the explosion killed him.

290.—**Mutilation of both legs with blind wound of the right thigh and fracture of the nasal bone** :—T. Kaneko, aged 41, quarter-master on the Tsukushi, in the course of the bombardment of the forts on Zhih Island, was standing to starboard of the funnel, when a hostile shell pierced through the lower part of the funnel and carried away his right and left legs at the upper parts of the tibiæ,

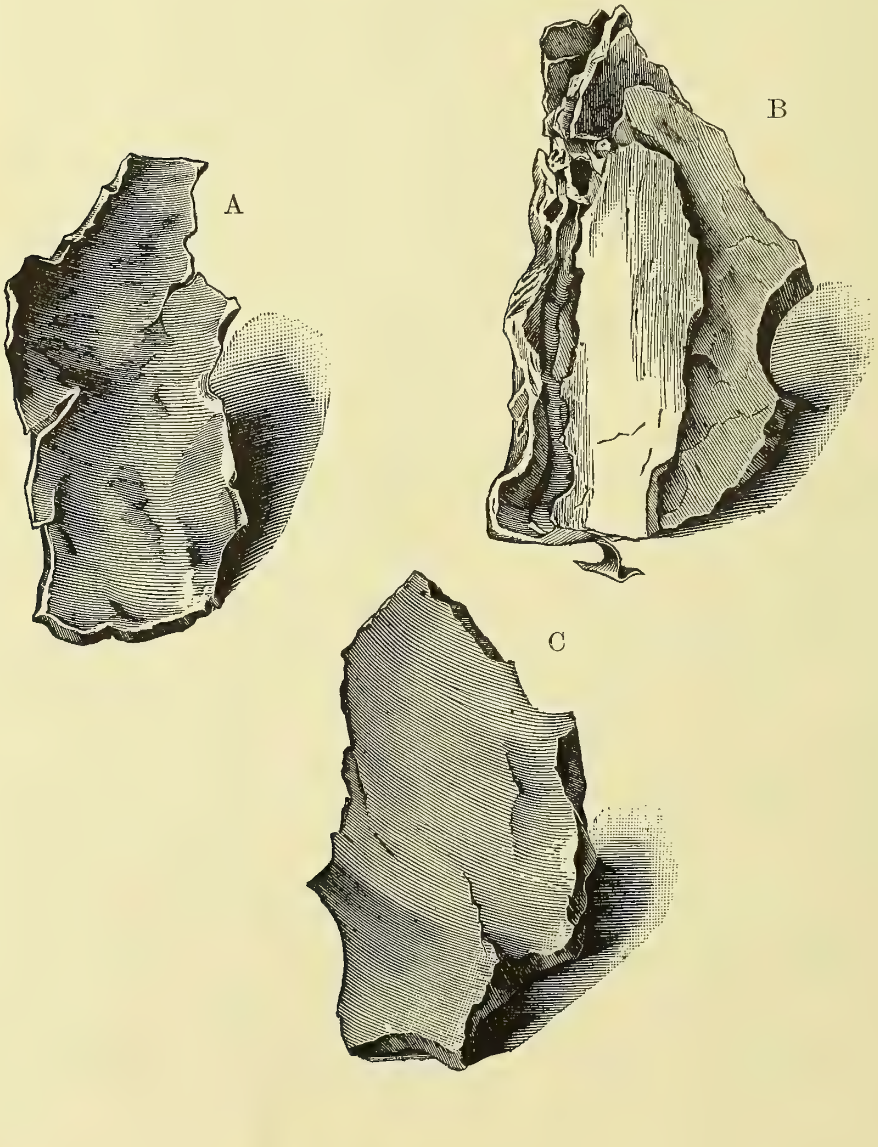


Fig. 15. Iron pieces extracted from the wound of the right thigh.
(A. B. C. show three pieces which were laid layer on layer).

hæmorrage was profuse. Also on the outer side of the right thigh 3 shell-like iron fragments (probably broken pieces of the funnel casing. See figure No. 15) were found. Besides, the face had been struck by iron fragments, the bridge of the nose was broken and he was bleeding from the mouth and nostrils. He was unconscious, breathing very weak, and pulse faint. Measures were immediately taken to stop the bleeding, and injection of ether or various other steps were resorted to, but the injured man at length succumbed at 1.40 p.m. the same day.

291.—**Mutilation of the right leg with fracture of both humeri**:—M. Hashimoto, aged 26, one of a gun-crew on the Fusō, at the battle of the Yellow sea, was resting on the port side of the funnel casing, when a shell pierced through the lower part of the funnel, and several iron fragments struck his right leg and carried it away at its middle part. At the same time he received compound fractures of the upper arms, both humeri being broken to pieces, and bleeding was profuse. The face was very pale, pulse weak, and intermittent, and he was in a comatose condition. The anterior and posterior tibial arteries were ligatured and the wounds on both arms filled with balls of gauze to stop the bleeding, antiseptic dressings were applied, and brandy was administered from time to time. In a short time the pulse became somewhat stronger, but at 11 p.m., the patient succumbed.

(E) INJURIES OF THE ANKLE JOINT.

292.—**Contusion of the left ankle**:—M. Shioda, aged 34, clerk of the Matsushima, in the engagement of the Yellow sea, was assisting in the surgery on the lower deck, but as the surgery was blown to pieces by a hostile shell, he went to the surgery in the forepart of the upper deck and was attending to the wounded, when a 30.5 c.m. hostile shell burst in the fore part of the lower deck, and damaged the decks and fittings. By one of the scattering splinters he received a contusion on the ankle joint, which was bandaged up, and he went on with his duties. Some days after, a swelling appeared on the outer-side of the joint, which prevented him from walking on account of pain, so constant applications of lead lotion were ordered, and by the 30th, the swelling had remarkably subsided; so tincture of iodine was painted on, and a bandage applied. On October 9th, the patient was completely recovered.

293.—**Sprain of the ankle joints with burns of the face and the upper limb**:—M. Yamaguchi, aged 19, a signal-man on board the Matsushima, in the engagement of the Yellow sea, was assigned to the post of messenger and was carrying orders to the lower deck from the 1st hatch in the fore part of the upper deck, when a 30.5 c.m. hostile shell burst in the fore part of the lower deck and set on fire a large amount of ammunition provided for the side gun. The shock of the explosion, threw him up and sprained the ankle joints. In addition, the explosion flame caused burns of the second degree on the face and forearms down to the fingers. The injuries were temporarily dressed on board the ship, and on the 20th the patient was admitted to the Sasebo Naval Hospital. To the burns wet boracic dressing was applied, and the ankle joints were put on splints. The burns progressed favorably and healed by October 5th, but the swelling and pain of the ankle joints remained. By the middle of December the swelling had gradually subsided, but the pain still lingered, and on standing congestion in the injured limb would occur. Chronic inflammation of the injured joint set in, which offered no prospect of easy recovery, so the patient was discharged from service, June 6th 1895, and pensioned according to the regulations.

294.—**Sprain of the right ankle joint**:—S. Senoō, aged 22, a seaman belonging to the Kaimon, was on duty as sentinel at an occupied fort of Liucho-tsai, Weihaiwei, on February 2nd, 1895, when a hostile shell burst about 2 metres from him. The shock threw him down from the 4th barrier on to a shell-wagon and sprained the right ankle. The injured part became swollen and painful, and he could hardly walk. On the 9th, he was admitted to the 2nd fixed army hospital at Kosangō, and on the 16th, was transferred to the Hiroshima army hospital. At the time, the right ankle joint was much swelled, with pain on flexion and extension. A mixture of ichthyol and iodine was painted on, and the limb was kept at rest. On March 10th, he was transferred to the Kure Naval Hospital; and the swelling of the joint had nearly subsided, but was somewhat larger compared with the sound one, and walking power was regained. By active movements of the limb and hot bathing, he was completely cured, and on the 16th of the same month, returned to service.

295.—**Sprain of the left ankle and burns of the right leg**:—K. Shigeru, aged 22, one of a gun-crew of the Matsushima, at battle of the Yellow sea, was firing from the No. 7 light Hotchkiss gun, on the starboard side of the flying deck, when a hostile shell exploded against the gun-support. By the shock, he was thrown down, and the left ankle joint was sprained; the explosion flame also inflicted a burn of the 2nd degree on the outer side of the right leg. He also sustained three small lacerated wounds just above the inner malleolus of the right leg. The burned part was covered with oiled lint, the lacerated wounds with sublimate gauze, and the injured joint fixed with a splint. On the 20th, the patient was taken to the Sasebo Naval Hospital. Conditions of the wounds:—The left ankle joint was hot, swollen and painful, preventing walking. As regards the burns of the right leg, the epidermis was entirely stripped off, exposing the Malpighian layer, which was slightly suppurating. The lacerated wounds of the right foot were already healed. The left ankle joint was supported by a splint, and lead lotion applied and the burns were dressed daily with wet boracic lint. On the 5th October, the discharge from the burns had ceased, and the epidermis had grown in the margins, so the former application was replaced by boracic ointment. The pain in the ankle joint had greatly subsided, yet the swelling still remained. On the 12th the burns were completely healed, and the inflammation of the ankle abated, so mercurial ointment was tried. On November 2nd, the swelling of the ankle joint at last subsided and no pain was felt on pressure, though walking hurt. Tincture of iodine was painted on; in December, both pain and swelling had nearly disappeared and the patient could run freely. On the 30th, he returned to service.

296.—**Simple fracture of the right malleolus with partial dislocation of the ankle joint, burns of the face and hands**:—S. Miyashita, aged 30, senior nurse of the Hiyei, in the engagement of the Yellow sea, was bandaging a wounded man in the surgery, on the lower deck, when a 30.5 c.m. shell exploded in that room. The explosion flame inflicted burns on the face, forearms, and hands; moreover the shock threw him down on the deck and sprained the right ankle joint. The same shell killed all the medical staff on board the vessel, so he was temporarily dressed by a comrade and was treated by surgeons from other ships, when the ship arrived at the rendezvous near Cape Choppeki next morning. On examination, the whole face was blackened by the flame, the forearms and hands sustained burns of the 2nd degree, also the right ankle joint was swollen and painful, with subcutaneous extravasation. Oiled lint was applied to the burns, and to the ankle joint lead lotion. On the same day, the patient was removed on board the transport Genkai-maru, and taken to the Sasebo Naval Hospital on the 21st. At this time, the burned parts were exposing dermis here and there, the face was covered with black scabs, the lobes of the ears suppurating, and both membrana tympani were found perforated, causing dulness of hearing. As the right ankle was greatly swollen, the exact condition of the joint could not be ascertained. On the dorsum of the 4th toe of the right foot there was a lacerated wound 2 c.m. long. The burned surfaces were cleansed with solution of boracic acid, and protected with boracic gauze, the auditory meatuses were plugged with antiseptic cotton and the ankle joint was kept in a splint and constantly cooled. On the 30th, the burned parts were nearly covered with new epidermis, and the wound on the toe had grown healthy granulation, while the inflammation of the ankle joint and the rupture of the tympanic membranes presented no change. This day the patient was transferred to the Kure Naval Hospital. On October 7th, the wound of the toe had healed. The auditory meatuses were washed with solution of boracic acid as there was a discharge of pus. In course of time, the inflammation of the ankle joint gradually abated, and it was found that there was a fracture of the outer malleolus and partial dislocation of the joint. The ice-bag was given up, the dislocation was replaced and the part was fixed with plaster of Paris bandage. On November 30th, the lacerations of the membrana tympani were healed, leaving induration of the membranes and dulness of hearing. The inflammation of the ankle joint had nearly disappeared and the plaster bandage was removed. As the broken malleolus had not completely united, and the restoration of the dislocated joint was not perfect, the sole of the right foot was inverted and prevented walking. By December 21st, the injury of the ankle joint had healed leaving a slight deformity, and lameness but as his health was otherwise quite restored, he left the hospital to return to service.

(F) INJURIES OF THE FOOT.

297.—**Contusion of the right foot**:—J. Uyeda, aged 35, a petty officer of the Akagi, during the battle of the Yellow sea, was on duty in the fore part of the upper deck, when a fragment of a shell entered from the starboard after quarter, passed beneath the shield of No. 3 Q.F. gun in the waist of the upper deck, went to the fore part of the same deck, struck the outer side of his left foot and inflicted a contused wound. On examination, there was a small swelling on the outer side of the dorsum of the left foot, with pain and extravasation under the skin, causing difficulty in walking. Lead lotion was applied, and the patient was ordered to rest. On the 22nd the swelling gradually abated, and walking became easy. On the 26th, he was completely recovered.

298.—N. Kurita, aged 35, Lieutenant of the Katsuragi, in the course of the attack on the eastern forts of Liukung Island, February 9th, 1895, while commanding the bow-gun, had his left foot pressed on by one of the hind wheels in the recoil of the gun. On examination, over the dorsum of the 4th and 5th metatarsals of the foot, a slight swelling and subcutaneous extravasation were found, with pain, but no lesion of bones. Lead lotion was applied and rest ordered. On the 16th, the extravasated part broke, producing vesicles. Carbolic gauze was applied, and on the 1st of March he had quite recovered.

299.—**Abrasion of the right foot**:—I. Oshima, aged 28, one of a gun-crew on the Hashidate, in the engagement of the Yellow sea, was firing the Hotchkiss gun, on the port fore-quarter on the upper deck, when a hostile shell burst in the turret of the bow gun. One of the shell fragments caused an abrasion 1.5 c.m. in diameter upon the tendo Achillis of the right leg. By the application of corrosive gauze the wound healed by scabbing on the 20th.

300.—**Contused wound of the right foot**:—M. Takashima, aged 28, Lieutenant of the Hiyei, during the battle of the Yellow sea, was, as commander of the port battery, passing along the port fore quarter of the upper deck, when a shell came over the starboard waist netting and burst against the stanchion of the port booms. A small shell fragment struck him just below the inner malleolus of the right foot, and caused an irregular round wound 1 c.m. in diameter and measuring only 6 m.m. in depth. Corrosive gauze was applied. On the 21st, the wound was completely healed by first intention.

301.—**Contused wound of the right foot with punctured wound of the left leg**:—S. Yoshimura, aged 31, a gunner of the Akitsushima, in the engagement of the Yellow sea, was inspecting the stern gun, when a shell broke the lower part of the shield, then struck, and glanced off the deck. A wooden splinter wounded him on the right foot. On examination, there was found a lacerated wound between the 3rd and 4th toes running backwards along the sole of the foot; it reached the metatarsals, stripping off the periosteum, and severing the small arteries. Another lacerated wound, 6 c.m. in length, extended along the outer border of the same foot from the root of the little toe. Besides, on the inner and back part of the the left calf there was a lacerated wound caused by a small wooden splinter. It was, however, shallow, being only of subcutaneous depth, and the splinter was extracted. Hæmorrhage was checked, the wounds washed, and antiseptic bandage applied. On the 19th, the patient was removed on board a homeward bound transport and conveyed to the Sasebo Naval Hospital on the 21st. At that time, the foot was swollen and discharged slight pus from the wounds, so it was washed with carbolic lotion, corrosive gauze applied, and the injured limb kept elevated. By October 1st, the wound on the left calf was healed, the swelling of the right foot abated, and the wound filled with healthy granulation. On the 9th, the wound on the outer side of the right foot was healed, and that on the sole had grown very shallow, though there was still some discharge of pus. By the 16th, the wounds were all healed, but the patient was still kept in the hospital, as walking was not perfect, owing to a lingering swelling in the dorsum of the foot, but on the 24th, he was perfectly recovered, and returned to service.

302.—**Blind wound of the right foot:**—M. Kato, aged 26, one of a gun-crew of the Hiyei, in the battle of the Yellow sea, was firing the No. 8 port gun on the quarter deck, when an enormous shell exploded in the ward-room at the stern of the lower deck, and one of the fragments, bursting out of the sky-light, penetrated his leg just above the inner right ankle. He immediately extracted the fragment himself. As the same shell killed all the medical staff on board the ship, he bandaged the wound himself, and was treated next morning by a surgeon from another ship, and admitted to the Sasebo Naval Hospital on the 21st. Conditions of the wound:—In front of the inner malleolus of the right foot was found a lacerated wound 3 c.m. long, and 5 c.m. deep. It was suppurating slightly and touched the bone, which, however, was not injured. Treated antiseptically, it progressed favourably. He was, on the 30th, transferred to the Kure Naval Hospital, and returned to service on October 24th.

303.—**Blind wound of the right foot with abrasion of the right leg:**—Y. Okamoto, aged 18, a blacksmith on board the Itsukushima, in the battle of the Yellow sea, was serving ammunition to the 12 c.m. guns. He was going to the fore-part of the upper deck, when a hostile shell exploded piercing the forward port netting. Some of the fragments inflicted a small blind wound at a part 3 c.m. below the outer malleolus of the right foot, and a small abrased wound in front over the right tibia. Corrosive gauze was applied. On the 20th, the patient was admitted to the Sasebo Naval Hospital, and by that time, the wound on the right leg had healed, but on probing the canal of the wound of the right foot, a depth of 3 c.m. running backwards and upwards with a small fragment at the bottom was found. The fragment was extracted and antiseptic dressing applied. On October 1st, the patient returned to service.

304.—**Compound fracture of the left foot with contused wounds of the head, face and thighs** :—While B. Sato, aged 24, a seaman belonging to the Amagi, was firing upon an enemy's ship from the fort of Liucho-tsai, Wei-hai-wei, on January 30th, 1895, a shell struck the barrel of the gun, and exploded, knocking the gun to pieces. Some of the shell-fragments caused several wounds, viz:—A lacerated wound over the vertex, 6 c.m. long, 1 c.m. wide, reaching the pericranium and piercing the occipito-frontalis ; a lacerated wound 3 c.m. long and 1 c.m. wide running transversely from the right side of the upper lip below the nose, several grains of powder also penetrated into the skin of the face ; an oval-shaped lacerated wound, 12 c.m. long and 7 c.m. wide, extending from the inner and upper side of the left thigh to its posterior part ; a lacerated wound, 7 c.m. long, on the posterior surface of the lower third of the right thigh, compound fracture of the 1st, 2nd and 3rd toes of the left foot. The wounds were simply dressed on the spot, and on the 31st the wounded man was conveyed to the 2nd field hospital belonging to the 6th Army Division. At the hospital, gangrene of the great, 2nd, 3rd and 4th toes of the left foot set in, so on the 10th of February amputation by Lisfranc's method was performed. By the 16th the lacerated wounds on the head and face cicatrized, and those of the thighs developed healthy granulation. On the 25th as the stump of the left foot had nearly united, the sutures were removed and the foot was dressed with iodoform gauze. On the 28th, the patient was transferred to the provisional army hospital at Hiroshima. After a time, the wounds of the right and left thighs healed by granulation, but the amputated part of the left foot, had formed a sinus in its middle, which constantly discharged slight pus. On May 16th, the patient was transferred to the Kure Naval Hospital. At this time, the sinus of the foot was 1 c.m. in depth, still discharging slight pus. It was washed with carbolic lotion, iodoform sprinkled on, and touched occasionally with nitrate of silver. By July 5th, the wound was completely healed, but owing to the loss of the toes of his left foot he was lame. However with a protecting bandage, he was ordered to take suitable exercise; the general strength gradually returned, and the cicatrix of the wound became firm. On October 23rd, he was discharged from service for life, and granted a pension according to the regulations.

305.—**Blind wounds of the right foot and thigh** :—F. Hioki, aged 25, one of a gun-crew of the Akitsushima, in the engagement of the Yellow sea, was standing behind the No. 6 Hotchkiss gun, in the port waist of the upper deck, when a shell exploded against the shield of No. 5 starboard side-gun. Some of the shell fragments inflicted a lacerated wound on the outer and back part in the lower third of the right thigh, which measured 5 c.m. in depth, and retained a shell-fragment at the bottom, which was extracted; on the dorsum of the right foot, between the 3rd and 4th toes, was a lacerated wound 2 c.m. in length, and 5 c.m. in depth, running inwards and backwards, which had broken the 1st and 2nd metatarsal bones. The wounds were dressed with antiseptic precautions and the patient was admitted to the Sasebo Naval Hospital on the 21st. On the 22nd, the wound on the dorsum of the foot was enlarged, the anterior half of the 1st and 2nd metatarsals were cut off, and three small shell fragments taken out. Antiseptically treated, progress was favorable. On October 30th, the wound of the thigh formed cicatrix, and on December 17th, that of the foot was closed. Owing, however, to the loss of the anterior half of the 1st and 2nd metatarsals, walking was imperfect, so he was dismissed from service for life and pensioned according to the regulations.

(G) INJURIES OF THE TOES.

306.—**Contused wound of the right toe**:—O. Hayakawa, aged 22, one of a gun-crew of the Hashidate, in the engagement of the Yellow sea, was working at the bow-gun, when a well-directed shell burst against the inner wall of the shield of that gun. One of the shell fragments caused a contused wound on the right 2nd toe, 1 c.m. long, running laterally over the 1st joint reaching to the periosteum, but without injuring the bone. During treatment, inflammation set in in the 1st joint, and walking became difficult, so the patient was, on December 26th, transferred to the Kure Naval Hospital. At the time, the injured toe had a granulating surface, and the joint was stiffened, attended by pain. Wet carbolic compress was applied. On January 19th, 1895, he returned to service completely cured.

307.—**Contused wound of the left toe**:—U. Kamei, aged 23, one of a gun-crew of the Fusō, during the attack on Zhih Island, February 7th, 1895, was resting on the bollard head on the starboard forecastle, when a hostile shell burst, piercing the gallant-forecastle. A shell-fragment inflicted a contused wound on the great and 2nd toes of the left foot; the tip of the great toe was swollen on account of subcutaneous extravasation and the skin over it was cracked; the tip of the 2nd toe was crushed, exposing the ungual phalanx. The ungual digit of the 2nd toe was cut off and the flap sutured up. By the 20th, both the flap of the 2nd toe and the skin over the tip of the great toe became gangrenous, discharging a fœtid fluid, so the stitches were removed. On March 19th, as the granulating surfaces were dull, they were touched with nitrate of silver. In June the granulation became healthy, a new skin formed around, and on the 17th, cicatrix had completely formed.

9.—BURNS.

(A) BURNS OF THE WHOLE BODY, AND OF THE GREATER PART OF THE BODY.

308.—**Burns of the whole body**:—T. Miura, aged 20, a seaman acting as an ammunition tender on the Matsushima, in the battle of the Yellow sea, was engaged in lifting ammunition at the entrance of the foreward magazine of the lower deck, when a 30.5 c.m. shell of the enemy, after striking the shield of No. 4 port-gun burst, setting on fire the ammunition provided for the gun. The flame from the explosion burnt the whole body, and he died before medical relief could be afforded.

309.—**Extensive burns covering two-thirds of the surface of the body**:—D. Ozaki aged 29, a gunner on the Matsushima, during the battle of the Yellow sea, was firing No. 2 port-gun in the fore part of the lower deck, when a 30.5 c.m. shell burst against the shield of No. 4 side-gun. It set on fire the ammunition piled near, resulting in an explosion which burned the entire surface of his body excepting the chest, epigastric region, and inner parts of the thighs. The injured man was taken to a cabin and oiled lint applied to the burns. He was kept perfectly quiet, and brandy administered at intervals. Towards night the pain became intense and he complained of terrible thirst. Cold water was given frequently, and a stimulant and anodyne were alternately administered. On the morning of the 18th he died from collapse.

The following burns extending over two-thirds of the body were caused by the same accident on board the Matsushima; the conditions of the injured, and the treatment pursued was the same, therefore to avoid repetition only their names, ages, ranks, and resulting history are given, as an illustration of the terrific havoc and loss of life that may result from the explosion of a shell.

310.—Y. Sekiya, aged 25, member of crew of No. 2 side-gun; died next morning.

311.—T. Hirao, aged 20, member of crew of No. 2 side-gun; died on the second morning.

312.—S. Nishi, aged 27, gunner of No. 5 side-gun; died on the third morning.

313.—K. Hata, aged 32, gunner of No. 6 side-gun; died on the second morning.

314.—S. Tokito, aged 21, member of crew of No. 6 side-gun; died next morning.

315.—J. Hayashi, aged 32, gunner of No. 8 side-gun; died on the second morning.

316.—M. Koyanagi, aged 25, member of crew of No. 8 side-gun; died on the second morning.

317.—Y. Hamamoto, aged 25, member of crew of No. 8 side-gun; died on the third morning.

318.—N. Nakama, aged 22, member of crew of No. 8 side-gun; died on the third morning.

319.—T. Nakada, aged 26, member of crew of No. 10 side-gun; died on the second morning.

320.—T. Inamitsu, aged 20, a seaman acting as a member of the fore magazine crew; died next morning.

321.—**Extensive burns as above with penetrating wound of the chest**:—K. Oishi, aged 24, midshipman; died during the afternoon of the next day.

322.—**Extensive burns with contusion of the buttock**:—Y. Higo, aged 21, one of No. 4 side-gun crew; died next morning.

323.—**Extensive burns with compound fracture of the left femur**:—K. Okazaki, aged 27, one of the crew of side-gun No. 6; died next morning.

324.—**Extensive burns with compound fracture of squamous portion of the left temporal bone**:—S. Yamazaki, aged 30, a seaman acting as a member of the fore magazine crew; died next morning.

325.—**Extensive burns with penetrating wound of the cranium:**—J. Nakashima, aged 21, a junior bandsman stationed as a bearer of wounded on the fore-quarter of the lower deck; died next morning.

326.—**Extensive burns with contused wounds of the left arm:**—S. Hamano, aged 25, one of No. 6 side-gun crew; died next day.

327.—**Burns**: (covering about ⅔ of the body) K. Doshimo, aged 30, a gunner of the Matsushima, in the engagement of the Yellow sea, was standing by the fort of No. 7 side-gun on the starboard side in the fore part of the lower deck, when a 30.5 c.m. hostile shell burst against the shield of No. 4 side-gun on the port side of the same deck, igniting the ammunition provided for the side-gun; from the explosion extensive burns of the 2nd degree were caused, covering the head, face, the whole of the left upper limb, right forearm, hand, and the entire surface of both lower extremities. The injured man was immediately carried to the cabin and the burnt surface dressed with oiled lint, and brandy administered. On the 18th, no marked change; the patient took only a little quantity of condensed milk. On the 19th, the dressings were renewed; exhaustion seemed increasing. Brandy and water was given at intervals. On the 20th, he was admitted to the Sasebo Naval Hospital, when the burned parts presented a black eschar with adhering grains of powder and points of suppuration, while here and there, the true dermis was exposed. As a dressing a solution of boracic acid on lint was applied, and the patient given brandy frequently during the night, the thermometer showed 37°. 6 C. with distress and sleeplessness. On the 21st, the temperature rose to 38° C., the mind seemed to be clear except for occasional delirium. The dressings were soiled by serous pus and they were changed. In the evening he complained of great pain, and doses of opium were given as a hypnotic. On the 22nd, a small quantity of urine was passed for the first time since his admission to the hospital. Dressings were renewed. The burned epidermis was almost exfoliated. That night the temperature rose to 39° C., and the next morning it remained the same; a dose of quinine was given and the dressings changed. In the afternoon the thermometer indicated 38.°8 C., delirium was frequent and the distress intense. At 5 o'clock in the afternoon sudden collapse supervened and he died at 6.30 p.m. (the temperatures given here were taken from the chart after admission to the hospital).

328.—C. Kosugi, aged 28, clerk on board the Matsushima, during the battle of the Yellow sea, was assigned as a carrier of the wounded. At 3. 26 p. m. he was

Fig. 16.

Temperature chart of case 327.

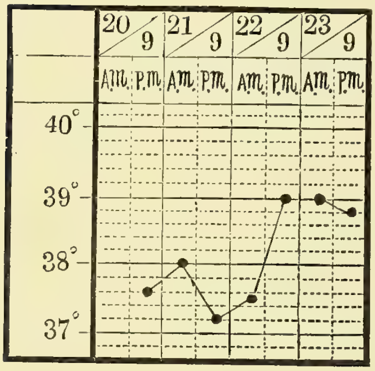


Fig. 17.

Temperature chart of case 328.

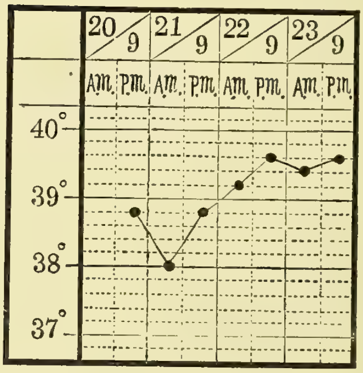
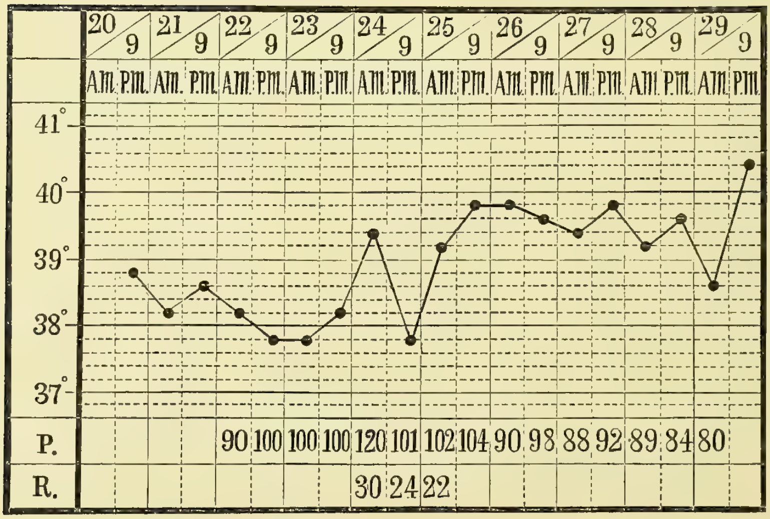


Fig. 18.

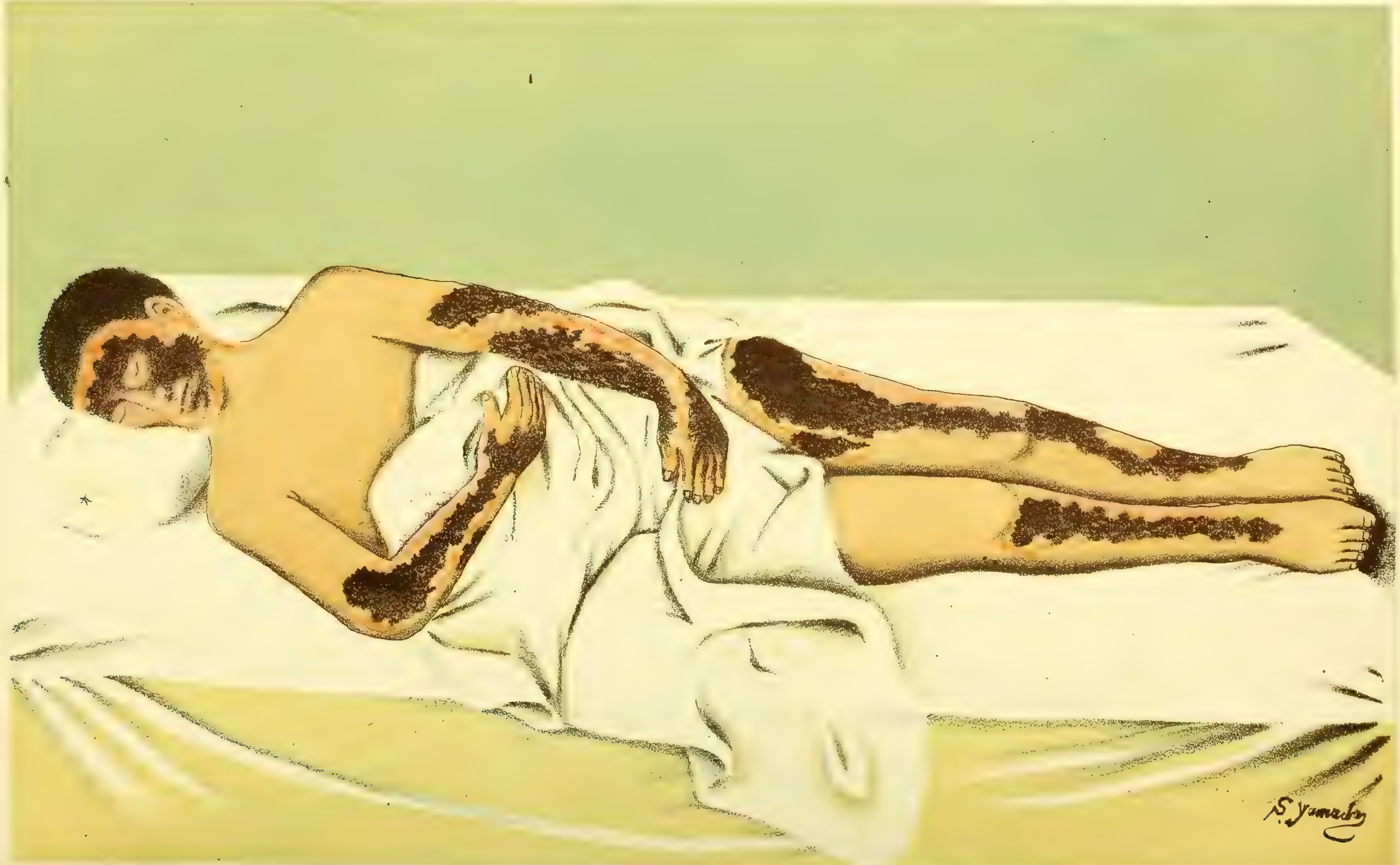
Temperature chart of case 329.



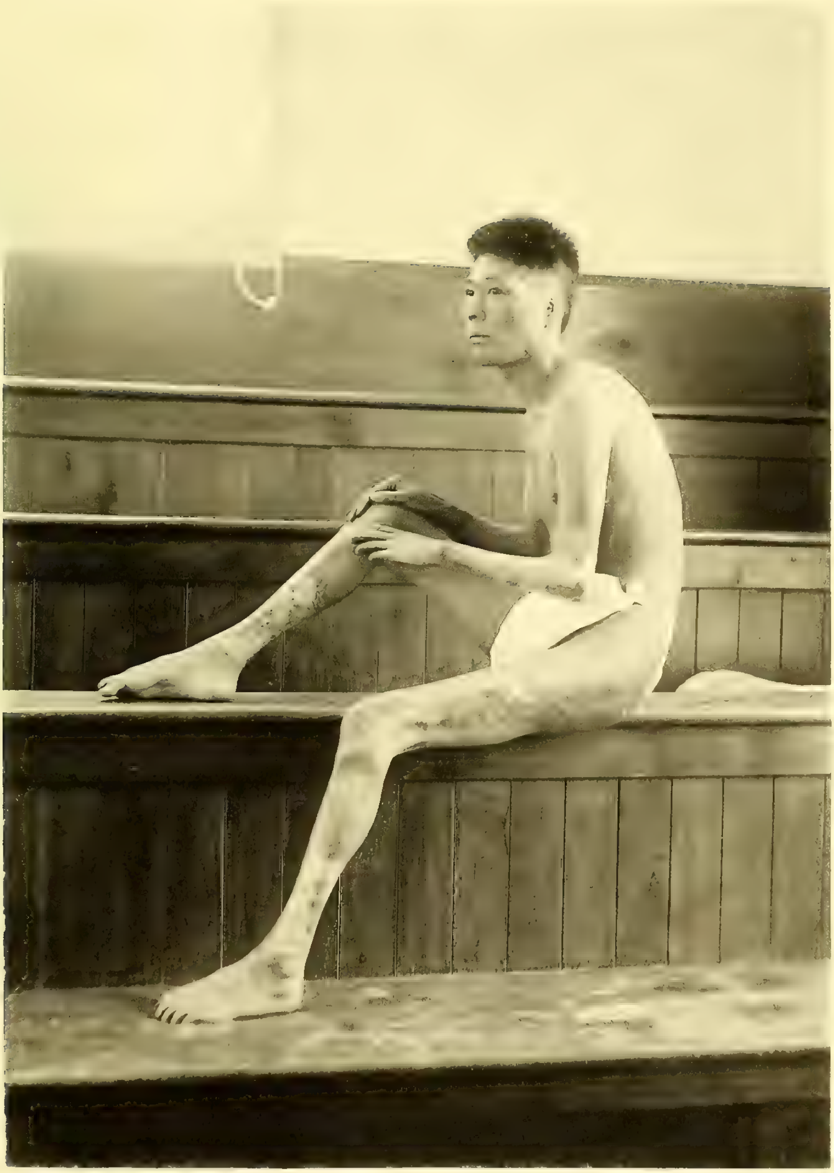
passing No. 9 side-gun in the fore part of the lower deck when a 30.5 c. m. shell burst setting on fire the ammunition piled near for the use of the side-gun. He sustained burns of the 2nd degree on the head, face, the whole of the right upper limb, the left forearm, both legs, the whole of the back, and the whole of abdomen, his burns thus covering about two thirds of the whole body. He was immediately carried to the cabin, and treatment promptly commenced. On the 20th, he was admitted to the Sasebo Naval Hospital. At this time—the face was covered with black scabs, the hair of the head singed, and the epidermis on the burned surfaces of the abdomen, back, and limbs stripped off, exposing the dermis ; at other points the cuticle was raised into vesicles with points of suppuration. He was restless, his mind being alternately clear and then clouded by delirium with moments in which he seemed semi-comatous. Temperature 38°. 8 C. The burns were dressed antiseptically daily ; internally, a sedative was administered. On the 21st, no change in symptoms ; the thermometer indicated 38° in the morning and 38°. 8 in the evening. In the night a small quantity of urine passed ; on the 22nd the temperature rose to 39°. 6 C. with increased exhaustion, the mind clear, but excited. Stimulants were administered at regular intervals. On the 23rd, at 4 o'clock in the afternoon abrupt unconsciousness supervened with chilling of the limbs. Various measures for restoration such as hypodermic injection of camphor oil, repeated administrations of brandy, hot bottles to the limbs etc., were tried in vain, and at 4. 30 p. m. the patient died from collapse. (The temperature chart shows the state after the admission).

329.—K. Ishihara, aged 23, stoker of the Matsushima, during the engagement of the Yellow sea, was in charge of the room for the rudder-gear, in the upper part of the fore engine room, when, owing to the same explosion, he sustained burns of the 2nd and 3rd degrees on the head, face, neck, right shoulder, chest, back, the whole of the right upper limb, the left forearm and hand, right lower limb, part of the left thigh down to the inner side of the knee, including about two-thirds of the whole body. The injured man was directly carried to the cabin, and temporary treatment applied. On the 20th, he was admitted to the Sasebo Naval Hospital, at which time the following history was elicited : Face partialy denuded of the epidermis: the burns of the upper and lower limbs extended into the deep tissues causing a gangrenous state of the soft parts. The rest of the burned parts were of the 2nd degree, exposing the dermis. Temperature was 38°. 8 C.: the general strength had failed, and the patient was groaning in anguish. Administration of stimulants was resorted to, the burns were dressed with wet boracic lint which was daily changed. On the 25th, the temperature suddenly rose to 39°. 7 C. and continued up to the 28th. Exhaustion increased more and more, delirium supervened and on the 29th at 5 o'clock p. m. there was a sudden loss of consciousness. Death occurred at 7. 30 p. m. (see Fig. 18).

330.—**Burns** (covering one-third of the body)—C. Onishi, aged 24, one of the gun-crew of the Matsushima, in the battle of the Yellow sea, was engaged in the conveyance of cartridges by the No. 10 side-gun, on the port side in the fore part of the lower deck, when owing to the same explosion he sustained burns of the 2nd and 3rd degree covering one third of the body, viz :—on the head, face, neck, interscapular region, and both upper and lower limbs. The left upper and lower limbs were affected deeply into the muscles. The injured man was directly carried to the cabin and appropriately dressed. On the 20th, the patient was admitted to the Sasebo Naval Hospital. Condition of the patient:—most of the burned parts had their epdmrieis stripped off or presented vesicles ; in some parts the whole skin had became gangrenous. They were dressed with boracic lint, and brandy was frequently given internally. On the 29th, the burns of the left upper arm, the outer side of the left thigh, and the left ear, were severely eroded and discharging a great deal of pus ; accordingly these parts were washed with a carbolic acid solution. On October 9th, a new epidermis appeared over the denuded surfaces of the face and right upper arm, while the ears and the left limbs continued to discharge pus. On the 14th, the burns of the face, right forearm, and left leg were nearly covered with new epidermis, the rest still discharged pus ; exhaustion gradually supervened. On the 23rd, the heart became very feeble with faint pulsations, tincture of digitalis was given, and as the strength of the pulse continued weak, tincture of strophanthus the was substituted on the 30th. On November 18th, the granulation of the burned parts improved, and the discharge of pus decreased; the heart's action revived, and the strophanthus was withdrawn. Emaciation increased owing to heavy discharge of pus from the ulcerating surfaces. On December the 20th, the ulcerated parts on the outer side of the left arm and thigh presented dull red granulation, so wet carbolic dressings were substituted and daily renewed ; following this measure the granulation greatly improved, while the discharge of pus remarkably decreased. On January 19th, 1895, small patches of epidermis developed over the burnt surfaces of the left upper and lower limbs. The ulcerating surface of the right leg measured 28



C. ONISHI. 1ST ORDINARY SEAMAN "MATSHIMA" I. J. S.
BURN CAUSED BY EXPLOSION OF GUN POWDER.



COLLOTYPE. BY K. OGAWA.

APPEARANCE OF THE SAME PATIENT
AFTER RECOVERY.

c. m. in length and 6 or 7 c. m. in width with some healthy granulations. Following the above treatment, a dressing of lint soaked in boracic acid solution was used and iron and quinine given intervally. At intervals the affected parts evacuated large quanties of pus, which infecting the newly formed epidermis would retard its growth thus constantly checking what otherwise would have been steady improvement. On August the 12th of the same year, the burned parts on the right leg at last were perfectly covered with epidermis, and on the 23rd following the burn on the left leg was healed. On September the 30th, the burn on the inner side of the left arm was covered with epidermis. However, on the outer side of the lower part of the left arm, and thigh there were still broad ulcerated surfaces. The same treatment was pursued. About July or August of 1896, as the ulcerated surfaces had now no discharge of pus, skin grafting was repeatedly performed upon them; and on December 25th of the same year all the remaining surfaces of the burns were healed, having been entirely covered with epidermis. As has been stated, this case was one of the burns afflicting one-third of the body, and took more than two years to recover. He was now extremely emaciated and disfigured by ugly cicatrices all over the body :—a cicatrix extending from the forehead to the left temporal region with the loss of both external ears; two or three small cicatrices on the back; as to the left upper limb, a large cicatrix extending from the middle of the upper arm to the forearm and hand, as the consequence of the cicatricial contraction, the elbow joint was hindered in its movement, so that it could only be moved between 45° and 90°; the grasping power of the left fingers was almost entirely lost; as regards the lower extremities the whole of the left gluteal region, almost the whole exterior sides of the left thigh and leg, a part of the right gluteal region and almost the entire length of the inner side of the right leg presented white dotted cicatrices; both knee-joints crooked at 90°; the feet somewhat inverted, and the phalangeal joints partly flexed and could not be freely moved. Moreover, the extensors of the lower limbs being remarkably emaciated, the man could scarcely stand up with the help of a stick; tonics and nutritious measures were especially attended to, assisted by hot baths, electricity, shampooing, etc., and thus the general strength was regained a little, but the movements of the limbs could not be restored, therefore the patient was discharged, on January 22nd, 1897, from service and pensioned for life according to the regulations. (Of the two illustrations produced here, one is a picture from life at the time of injury, and the other is a collotype from the photogragh taken after recovery).

(B) BURNS OF VARIOUS PARTS.

All cases of burns which do not extend over one-third of the whole body are mentioned here.

331.—**Burns of the face, neck, left upper and both lower limbs with contused wound of the face**:—Y. Mori, aged 24, gunner of No. 5 side-gun. By the same cause as before he received burns of the 2nd degree on the face, neck, the left forearm and hand, the outer side of the left thigh and leg, the dorsum of the left foot, and the antero-external surface of the right thigh and leg. In addition to the above, a small contused wound on the right cheek was sustained by a fragment of shell. The injured man was carried directly to the surgery in the wardroom, and the burns dressed with oiled lint. On the 20th, he was admitted to the Sasebo Naval Hospital. Conditions of the wounds at the time of admission:—On several of the burned surfaces were vesicles, and where complete denuding of the epidermis had occurred, pus was discharging. The wound of the right cheek had healthy granulation covered with a thin layer of laudable pus. The burns were washed with boracic lotion and dressed with wet boracic lint. On October 8th, the epidermis was perfectly formed on the burnt surfaces of the face, neck, and the right leg; and the wound of the face was healed by scabbing. On the 18th, the burns of the right lower limb were healed; and those of the left lower limb were covered by the new epidermis, except on the ankle joint. Those of the left upper limb presented granulating surfaces with points of suppuration, this was especially so between the fingers, where the injury was deep beneath the skin. On the 30th, the burned surface of the left ankle joint was healed, and the granulating surface of the left upper limb had nearly ceased to discharge pus; so boracic ointment was applied in place of the wet lint. On December 18th, the burns on the left upper limb were healed by cicatrization, but the grasping power was impaired. Local bathing and active exercise of the hand were persevered with. On April 9th, 1895, though the flexion of the left ring and little fingers was not perfect yet, the grasping power gradually recovered indicating 20 kilog. by dynamometer; in this condition he returned to duty, and served for some time.

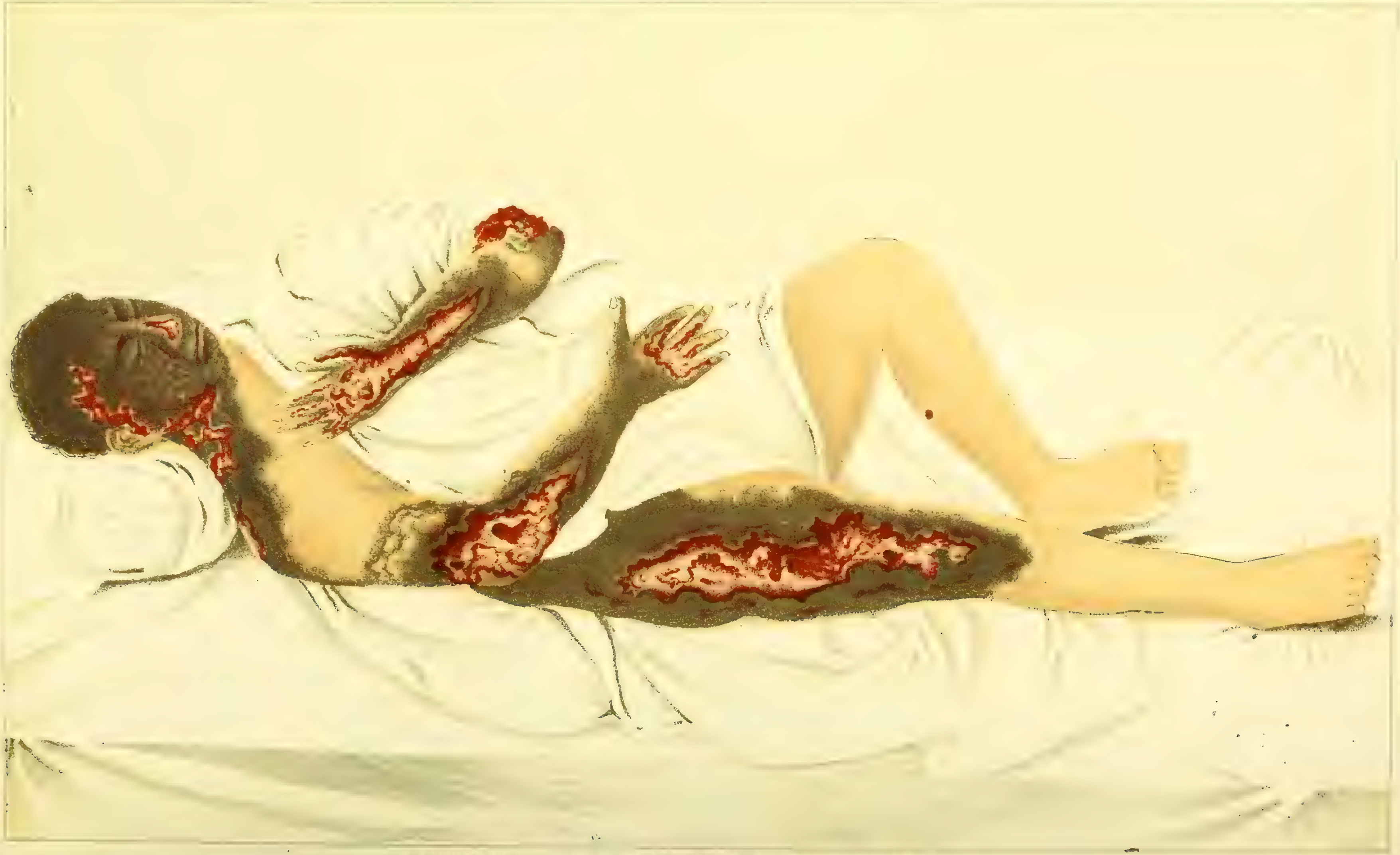
In the course of time, cicatricial contraction of the left fingers followed causing impairment of movement. Moreover hyperæsthesia in the cicatrix supervened, so the grasping power of the left hand decreased to 10 kilog. He was again admitted on August 9th, and several measures such as local bathing, massage, etc., were afforded but there was no hope of recovery, so he was, on September 5th, invalided and pensioned for life according to the regulations.

332.—**Burns of the face, neck and both forearms**:—S. Obo, aged 29, a gunner of No. 9 side-gun by the same cause received burns of the 2nd degree on the face, neck, and the parts below the middle of the right and left forearms to the finger-ends. The injured man was directly carried to the surgery in the ward-room, and dressed with oiled lint. On the 20th, he was admitted to the Sasebo Naval Hospital. At that time, the hair of the head was found singed; the face and ear-lobes swollen, producing here and there vesicles; the eye-lids, the tip of the nose, forearms and hands were denuded of epidermis exposing the dermis. Wet boracic lint was applied at first but as the case improved, it was replaced by boracic ointment. By the middle of October the epidermis completely formed over the burns, and healed without leaving cicatrices. On the 22nd, he returned to service completely recovered.

333.—**Burns of the face, nape of neck, shoulders, upper limbs and left leg**:—N. Ando, aged 31, gunner of No. 10 side gun, by the same cause received burns of the 2nd degree on the face, neck, shoulders, the left elbow, both forearms, left knee and the middle of the left leg. The injured man was directly carried to the surgery in the ward-room, and dressed with oiled lint. On the 20th, the patient was admitted to the Sasebo Naval Hospital. At the time, the face and ear-lobes presented a blackish colour, the hair singed, blisters and ulcerations were found on the burnt surfaces. Washed with boracic lotion and dressed with wet boracic lint. On October 28th, all the burns except on the ears were healed. The ear-lobes being deeply affected, a portion was destroyed of each lobe and now presented granulating surfaces. Boracic ointment was applied to the ears. On December 21st, he was returned to service completely healed.

334.—**Burns of the face, neck, right shoulder, upper arms, and right lower limb with blind wound of the left leg**:—T. Kurokawa, aged 30, one of No. 10 side-gun crew, by the same cause sustained burns of the 2nd or 3rd degrees on the face, ear-lobes, neck, right shoulder, the right arm to the hand, the left elbow joint to the hand, right gluteal region, and the outer side of the right thigh to the knee; and a blind wound 2 c.m. in diameter at the middle of the left calf. The injured man was directly carried to the cabin, and after the administration of brandy, the burns were dressed with oiled lint, and the wound of the calf with sublimate gauze. On the 20th, he was admitted to the Sasebo Naval Hospital. The face and ear-lobes were covered with black scabs, the forehead, neck, right arm, left forearm and the outer side of the right thigh were deeply eroded so that the deeper tissues were reached. The wound of the left leg measured 5 c. m. in depth and discharged pus. The temperature was 37°.5 C. Burns were washed with boracic lotion and wet boracic lint was applied; and a mixture of bark and brandy administered internally. On the 21st, the temperature was 38°2., the patient complained of intense thirst and anguish. Dressings were daily renewed; ice was given from time to time. On the 28th, the sloughs at several parts having been cast off, red granulating surfaces were exposed. Since the preceding day, the temperature returned to the normal degree and the pain much lessened. On October 6th, the wound of the left leg healed by cicatrix; and the burns of the face, ear-lobes, neck, shoulder and the left forearm were all healed; the burns of the forehead, right side of the neck, etc., which were deeply eroded developed granulations, the areas become narrower by degrees; the temperature remained normal. On the 18th, the forehead and right side of the neck formed cicatrices, and there was an inclination to a wry-neck owing to the contraction of cicatrix, so the neck was kept straight by means of a paste board splint. Afterwards nearly the whole of the burned parts and the wound scar of the left leg formed cicatricial keloid; consequently the wry neck towards the right side greatly hindered the movement. The right lower eye-lid was everted, and the corner of the mouth drawn towards the right and downward, the face became exceedingly ugly studded with scars. The right elbow joint could not be extended beyond 120°; the index, middle and ring fingers on the same side were much hindered in the movements. Also the left middle finger stiffened so that it would not be bent at all; and the ring finger at the 1st phalangeal joint, and the little fingers at the metacarpo-phalangeal and at the 1st phangeal joints were stiffened at right angle to the palm. The upper limbs were greatly impaired in their function, and the cicatricial parts were the seat of uneasy sensation of itching, and this sometimes prevented sound sleep. Disabled for service, he was on March 16th, 1895, invalided for life and granted a pension according to the regulation. (Of the two illustrations produced here, one is of the burns at the time of admission, and the other is a stereotype of the cicatricial keloid from the photograph taken after recovery).

335.—**Burns of the face and limbs**:—S. Hayashi, aged 23, a member of the magazine party of the Matsushima, in the battle of the Yellow sea, was engaged in lifting shells from the magazine in the fore part of the lower deck, when a 30.5 c.



T. KUROKAWA. ABLE SEAMAN. MATSUSHIMA. [illegible]
BURNS CAUSED BY EXPLOSION OF AMMUNITION.

m. shell burst against the shield of No. 4 port side-gun on the lower deck. At the moment abundant ammunition stored for the side-guns were set on fire, and by the flame of the explosion he received burns of the 2nd degree on the face, the right upper and lower limbs, and the inner side of the left leg. The parts were dressed with oiled lints and on the 20th, he was conveyed to the Sasebo Naval Hospital. At that time, blebs were formed on the burned parts, in some places, while the epidermis was cast off others, exposing the true skin. The burns were washed with boracic lotion and wet boracic lints applied. On October 11th, he completely recovered and returned to service.

Shortly after his return to service, eczema appeared on the burned parts, and gradually spread, accordingly on February 19th, 1895, he was again admitted to the Sasebo Naval Hospital. Then, the eye-lids, corners of the mouth, neck, and both legs had eczema, the eye-lids were excoriated and the conjunctivæ congested. The skin of the rest of the body was dry desquamating scales. Above conditions oscillated between improvement and retrogression to the failure of all measures of treatment. This was to be attributed to the impaired nutrition of the skin consequent to the burns, and thus judged no longer able for service, he was on January 31st, 1896, dismissed, and granted a pension for life according to the regulations.

336.—**Burns of the face, chest, abdomen and upper limbs** :—J. Mitarashi, aged 24, a member of the magazine party of the Matsushima, in the battle of the Yellow sea, was lifting shells at the entrance of the fore magazine, when a 30.5 c. m. shell burst striking the shield of No. 4 port side-gun in the fore part of the lower deck, at the same time causing the ammunition stored for the side-guns to explode. By the flame of explosion, burns of the 1st degree were inflicted on the face, chest, abdomen, and of the 2nd degree, on the inner side of the right upper and the outer side of the left upper limb. The burns were dressed with oiled lint, and on the 20th, the patient was conveyed to the Sasebo Naval Hospital. On admission, the burns of the face, chest and abdomen presented a dark reddish colour; those of the upper limbs had vesicles on or the epidermis stripped off. The burns of the 1st degree were painted with a mixture of boracic acid and olive oil, and those of the 2nd degree dressed with wet boracic lint. On October 1st, he completely recovered, and returned to service.

337.—**Burns of the head, face, neck and limbs** :—J. Matsuo, aged 22, a seaman of the Matsushima, in the battle of the Yellow sea, was carrying shells to the upper deck, when a hostile shell burst on the lower deck, and at the same time setting on fire the ammunition stored for the side-gun. By the flame of explosion, burns of the 2nd degree were inflicted on the head, face, neck, right shoulder, forearms and the lower part of legs. The burns were dressed on board the ship, and on the 20th, he was admitted to the Sasebo Naval Hospital. On admission, the burned parts were covered with blisters, and the epidermis stripped off at places, exposing the true skin. The face was covered with scabs, the conjunctivæ being slightly congested and attended by photophobia. On October 1st, the burns of the shoulder healed, and the rest were nearly covered with new epidermis, while that extending from the elbow joints to the forearms, still presented granulating surfaces with pus discharge. On the 11th, the burns of the face and legs were healed. On January 2nd, 1895, the burns of the forearms were healed by cicatrices. However, the epidermis being very thin it was liable to break, and the movements of the elbow joints were imperfect. Local warm bathing, massage, and liniments were resorted to. On April 9th, the patient almost recovered and returned to service.

338.—**Burns of the head, face, neck, upper limbs and feet**:—H. Matsuo, aged 30, senior blacksmith of the Matsushima, in the battle of the Yellow sea, was passing by the side of No. 1 starboard side-gun, in the fore part of the lower deck, when a 30.5 c. m. shell burst striking the shield of No. 4 side-gun, and at the same time setting on fire the ammunitions for the side-guns. By the flame of the explosion, he sustained burns of the 2nd degree on the head, face, neck, right upper arm, left forearm, and the ankle joints to the dorsi of feet. The burns being simply dressed on board at the time, he was, on the 20th, conveyed to the Sasebo Naval Hospital. On admission, the hair of the scalp was singed, and the integument covered here and there with scabs; the face blackened by the powder flame, and the ear-lobes stripped of the epidermis. As to the burns of the neck, and upper and lower extremities, there were vesicles, or the epidermis had excoriated, oozing serum. They were washed with solution of boracic acid, and wrapped with wet cloths saturated with the same lotion. On the 26th, the epidermis of the face was renewed, and the discharge from the burns of the upper and lower limbs lessened and new epidermis began to grow from the margins. On October 5th, the burns of the face and upper and lower limbs were nearly healed, so the only remaining parts were the ulcerated parts of the ear-lobes, and granulating part of the neck. Boracic ointment was applied. On the 20th, the burns were healed without leaving cicatrices, and on the 22nd, he completely recovered and returned to service.

339.—**Burns of the face, neck, and limbs** :—O. Kawaguchi, aged 31, a carpenter of the Matsushima, in the battle of the Yellow sea, was passing the fore part of the lower deck, when a shell burst against the shield of No. 4 port side-gun on the same deck and caused the ammunitions stored for the side-guns to explode. At this moment, by the flame of the explosion, he sustained burns of the second degree on the face, neck, the lower parts of both forearms to the hands, and the lower part of the left leg. The burns were temporarily dressed on board the ship and on the 20th, he was admitted to the Sasebo Naval Hospital. On admission, the burns produced vesicles or stripped off the epidermis where serum was oozing. The face was covered by black scabs with suppurating spots here and there. Wet boracic lints were applied. On October 13th, the burns were all healed without leaving cicatrices, and he returned to service on the 16th.

340.—**Burns of the face, forearms and left leg** :—Y. Kaburaki, aged 23, a carpenter of the Matsushima, in the battle of the Yellow sea, was posted as a fire-brigademan near the middle torpedo room, when a hostile shell burst striking the shield of No. 4 port side-gun, in the fore part of the lower deck, at the same time igniting the ammunition stored for the side-guns. By the flame of the explosion, he sustained burns of the 1st degree on the face, and those of the 2nd on forearms, and the front and outer side of the left leg. After being dressed on board the ship, he was, on the 20th, admitted to the Sasebo Naval Hospital. At this time, the skin of the face was congested but there were no vesicles formed; and the burns of the limbs had blebs formed here and there with abrasion of the epidermis. Wet boracic lints were applied. On October 14th, the burns completely healed and he returned to service.

341.—**Burns of face, neck, shoulders and forearms** :—K. Kawazoye, aged 21, a blacksmith of the Matsushima, in the battle of the Yellow sea, was standing, as a fire-brigademan, on the fore upper deck, when a hostile shell burst against the shield of No. 4 port side-gun, in the fore part of the lower deck. At the same time fire started by the explosion of ammunition stored for side-guns, and by its flame he sustained burns of the 2nd degree on the face, neck, shoulders, forearms and hands. Urgent relief having been afforded on board the ship, the injured man was, on the 20th, admitted to the Sasebo Naval Hospital. On admission, the face was covered with black scabs ; the conjunctiva was congested and the eye sight impaired. The burned parts of the neck and forearms were stripped off exposing the true skin. The burns were dressed with wet boracic lints, and the eyes with cold compress. On October 14th, the burns were all healed. Congestion of the left conjunctiva still lingered, and the sight was not restored yet, but the refractive bodies and fundus were found to be sound. Boracic compresses and astringent collyrium were used. On November 5th, he completely recovered and returned to service.

342.—**Burns of the head, face, neck and limbs**:—K. Masuda, aged 25, a seaman of the Matsushima, in the battle of the Yellow sea, was distributing grease to the guns in the fore part of the lower deck, when a shell burst against the shield of No. 4 port side-gun on the same deck; at the same time igniting the ammunitions of the side-guns. By the flame of explosion he received burns of the 2nd or 3rd degree on the head, face, neck, forearms, hands, right thigh and both legs. The burns were temporarily dressed on board the ship, and he was, on the 20th, admitted to the Sasebo Naval Hospital. On admission, the hair of the scalp was singed, the integument having here and there blisters; the face covered with thick black crusts; prominent parts such as the ear-lobes, nose, and chin exposed the true skin, the epidermis being denuded; the limbs also presented blisters or excoriations, the burns on the outer side of the right thigh and back of right hand were of the 3rd degree, the subcutaneous areolar tissues and fascia were deeply eroded presenting a sloughy appearance, the general strength failing, the patient suffering great distress. Boracic wet compresses were applied, and special attention paid to tonic measures. By October 4th, the burns of the face, left hand and foot began to grow epidermis, and the deeply eroded parts of the right hand and thigh were showing granulation. The ear-lobes were remarkably swollen, the cartilages mortified accompanied with subcutaneous accumulation of pus, which was given vent by an incision. On November 11th, the other burns except those on the ears, right hand and thigh, had healed over without leaving any cicatrix. By January 10th, of the next year, all the burns were healed, and the debility decidedly improved But on the back of right hand an extensive cicatrix resulted, and the extensor tendons of each finger became adherent; all the fingers became stiffened and could not be moved; also the wrist joint shared in the impairment of its movements. The ear-lobes, in consequence of dissolution of the cartilages had become withered thus destroying their contour, and the auditory canals were, by a large part, closed, so that the hearing was interfered with. This disabled him for service and he was, on March 17th, dismissed, and granted a pension according to the regulation.

343.—**Burns of the face and forearms** :—I. Fujita, aged 26, a seaman of the Matsushima, in the battle of the Yellow sea, was acting as an assistant signal-man on the fore part of the conning tower, when a hostile shell burst on the fore part of the lower deck, at the same time firing the ammunition stored for the side-guns. By the flame of explosion coming out to the upper deck, he sustained burns of the 2nd degree on the face, outer sides of the forearms, and the backs of both hands. The injured man receiving temporary treatment on board the ship was admitted to the Sasebo Naval Hospital on the 20th. On admission, the face was blackened by powder flame, the hair of head singed, and the forearms and backs of the hands were studded with blisters and excoriations. The burns were dressed with wet boracic gauze. On October 2nd, the burns of the face were healed, and on the 9th those of the upper limbs. On the 11th, he returned to service.

344.—**Burns of the face and forearms with sprain of the right ankle** :—A. Fukumori, aged 33, a member of the fore torpedo of the Matsushima, in the battle of the Yellow sea, was at work in the fore torpedo room, when a shell burst on the fore part of the lower deck and set on fire the ammunition stored for the side-guns. By the resulting flame rushing into the room, he received burns of the 2nd degree on the face, ears, and forearms, and at the same time, being thrown down by the shock of the explosion, the right ankle joint was sprained. The injured man was temporarily treated on board the ship, and on the 20th conveyed to the Sasebo Naval Hospital. When admitted, the burned parts were blistering and the epidermis coming off in places, attended by the formation of pus. The right ankle joint was swollen and of a purplish colour, the pain preventing him from walking. The burns were dressed with wet boracic gauze, and the ankle joint with lead lotion. By the beginning of October, the burns of the face were completely healed; and those of the forearms contracted to half the original sizes, the swelling of the ankle was gradually subsiding. On the 25th, the burns were all healed. The patient happened to be affected with sore throat, this was treated by gargle of chlorate of potash. On November 1st, the swelling of the ankle joint had entirely disappeared, but the local skin heat was comparatively high and a slight pain was felt in walking. Tincture of iodine was painted on. On the 14th, the patient returned to service.

345.—**Burns of the face and upper extremities** :—H. Nakamura, aged 34, a cook on board the Matsushima, in the battle of the Yellow sea, was going up the

1st hatch in the fore part of the lower deck, when a shell burst against the shield of No. 4 port side-gun in the fore part of the lower deck, at the same time exploding the ammunition stored for the side-guns. By the flame of the explosion, he received burns of the 1st degree on the face, and that of the 2nd degree on the right upper arm and left forearm to the end of the fingers. After temporary treatment on board the ship, he was, on the 20th, conveyed to the Sasebo Naval Hospital. On admission, the face was blackened, the ear-lobes, arm and forearms stripped of epidermis with blisters here and there. Wet boracic gauze was applied. He returned to service on October 14th completely healed.

346.—**Burns of the face, neck, chest and limbs with rupture of tympanic membranes**:—G. Tanata, aged 29, a seaman of the Hiyei, in the battle of the Yellow sea, was carrying a wounded man on the upper deck, to the surgery in the ward-room in the rear of the lower deck, when a 30.5 c.m. hostile shell exploded in the room. By the flame of the explosion, he sustained burns of the face, left side of the neck, the chest, the back, and the upper and lower extremities. On the same occasion all the medical staff on board were killed, so being temporarily treated by his comrades, he was properly treated by a surgeon from another ship, when the vessel arrived the next morning at the rendezvous near Cape Choppeki, and on that day, transferred to the transport Genkai-maru, and on the 21st admitted to the Sasebo Naval Hospital. On admission, the face was burned black with deep excoriations on it. The left side of the neck and chest had blisters, and nearly the whole of the left arm, right forearm, and left leg sustained burns of 2nd degree. The membrana tympani of both ears were ruptured. The burns were dressed with wet boracic gauze, and the ears plugged with antiseptic cotton wool. On the 30th, the burns of the face and neck were healed the parts being spotted with brownish dots; the forearms began to heal, while the rest was still ulcerating and discharging pus. This day the patient was transferred to the Kure Naval Hospital. Some time after, there accurred pus discharge from the ears attended by pain, so the interiors were examined and both tympanic membranes which had been lacerated were recognized still to remain widely open, the right ear having almost lost the power of hearing. They were washed with a boracic solution and a mixture of boracic acid and olive oil was dropped into them. By October 12th, all the burns had been healed, but the discharge from the ears still continued, always accompanied with heaviness of the head. By January 11th of the following year, the discharge from the ears had greatly decreased; however, there existed three perforations on the posterior part of the right membrane, and one on the anterior part of the left. The membranes were thickened and opaque, on examination by watch, the hearing proved to have been reduced to $\frac{10}{200}$ (right) and $\frac{30}{200}$ (left). Antiseptic lotion and administration of iodide of potash were resorted to. Later on, the discharge of the ears entirely ceased, but the perforations of the membranes remained unhealed, the dulness of hearing and somewhat idiotic state of the mind were left. Thus disabled for service, he was on April 18th discharged from service and granted a pension according to the regulation.

347.—**Burns of the face, neck and hands**:—D. Matsudaira, aged 36, a petty officer of the Yoshino, in the battle of the Yellow sea, was working at the rear of the upper deck, when a hostile shell pierced the starboard netting, and exploded against the two 12 c.m. shells placed along the netting ; as a result, he received burns of the second degree over the whole face (especially the right half, lips and ear-lobes), the front of the neck, the anterior aspect of the left wrist and palm, and the right wrist to the back of the hand and fingers. The hair of the scalp was signed, the skin congested and swollen, or blistered. Dressings of oiled lint were applied, and he was on the 23rd, taken on board a transport and on the 26th admitted to the Sasebo Naval Hospital. At the time of admission, most of the burns exposed congested true skin discharging pus. The burns were gradually healing, when on the 30th, he was transferred to the Kure Naval Hospital. At the time, most of the burns were covered with new epidermis, though some parts were ulcerated, yet the discharge was very slight. On November 5th, the burns were healed without leaving cicatrix, and he returned to service.

348.—**Burns of the face, upper arms and shoulder**:—S. Niibara, aged 22, a member of the magazine party of the Matsushima, in the engagement of the Yellow sea, was lifting ammunition at the fore magazine, when a hostile shell burst against the shield of No. 4 port side-gun in the fore part of the lower deck, at the same instant, setting on fire all the ammunition stored for the side-guns. By the flame of explosion he sustained burns of the 1st degree on the face, and those of the 2nd degree on the shoulders and upper arms. The burns were simply dressed on board the ship and he was admitted to the Sasebo Naval Hospital on the 20th. On admission, the face was blackened by powder, the hair singed. The parts extending from the shoulders to the anterior and external parts of the right and left arms, sustained burns of the 2nd degree, the epidermis being charred with blisters here and there, or were excoriated, exposing the true skin. Wet boracic gauze was applied. On the 27th, the epidermis began to form on the face and the sloughed cuticles of the upper limbs having separated, fresh ones grew from the margins, so that the ulcerated parts were gradually drying. On October 11th, completely recovered, he was sent back to service.

349.—**Burns of the right shoulder, arm and buttock**:—I. Terashi, aged 23, a member of the magazine party of the Matsushima, in the battle of the Yellow sea, was engaged in hauling up shells from the fore magazine, when a hostile shell burst against the shield of No. 4 port side-gun, in the fore part of the lower deck, at the same time setting the powder of the side-guns on fire, the exoplosion inflicting burns of the 2nd degree on the right side of the shoulder t- the outer side of the right arm and on the right gluteal region. The burns were dressed with oiled lint, and he was, on the 20th, conveyed to the Sasebo Naval Hospital. At that time, the burns had blisters and casting off the epidermis, exposed the true skin which was suppurating here and there. Lotion of boracic acid was applied. On October 10th, new epidermis completely formed on the burned surfaces, which were healed without leaving cicatrix. On the 11th, he returned to service.

350.—**Burns of the left shoulder, hands and left flank**:—Y. Isonaga, aged 21, a member of the magazine party of the Matsushima, in the battle of the Yellw sea, was on the steps of the fore magazine, when a 30.5 hostile shell burst against the shield of No. 4 port side-gun, in the fore part of the lower deck and at the same instant ignited the ammunition stored for the side-guns. By the explosion, he sustained burns of a slight degree on the right shoulder, ulnar half of both palms, the palmar aspect of the fingers and the right lumbar region. By application of oiled lint the burns completely healed on the 22nd.

351.—**Burns of the right side of neck and forearms**:—K. Yuwamoto, aged 29, a gunner of the Naniwa, in the battle of the Phung-do, July 25th, 1894, was firing by the fort of No. 2 15 c.m. gun, when the gas escaped out of the gun barrel and inflicted burns of the 2nd degree on the right side of the neck, and the forearms. Oiled lint was applied, and the burns healed on August 6th.

(C) BURNS OF LOCAL PART.

352.—**Burns of the face**:—H. Tanaka, aged 28, one of the gun-crew of the Naniwa, in the battle of Phung-do, was firing from the fort of No. 6 side-gun, when the gas escaped from the next gun, inflicting on him burns of the 2nd degree on the left half of the face, and the ear of the same side; also a slight burn on the left conjunctiva. To the burns oiled lint was applied, and boracic lotion to the eye. In course of time, the congestion of the conjunctiva gradually subsided, and the burns were completely healed on August 6th by a new growth of epidermis.

353.—**Burns of the right forearm and back of the hand**:—K. Yamanaka, aged 26, a bandsman of the Matsushima, in the battle of the Yellow sea, was, as a carrier of the wounded, standing in the fore part of the upper deck, when a 30. 5 c. m. hostile shell burst in the forepart of the lower deck. Instantly the shell set on fire the abundant powder of the side-guns, the flame of explosion coming up to the upper deck, he received burns of the 2nd degree on the right forearm and back of the hand. It was dressed with oiled lint and healed on October 3rd.

354.—**Burns of the left forearm**:—K. Kimura, aged 31, a seaman of the Hiyei, in the battle of the Yellow sea, was steering the rudder-wheel on the quarter-deck, when an enormous hostile shell exploded in the ward-room at the rear of the lower deck, by the shock he was thrown down through the sky-light of the ward-roon, where fire had burst out just before, so he received a burn on the left forearm. On examination, the burned part had blistered to a large size and the surrounding skin was congested. The blisters were opened to give vent to the serum, and the part was dressed with wet boracic gauze. On the 25th, sloughed epidermis came off and the true skin exposed. Boracic ointment was applied and the burns were gradually covered with new epidermis, and completely healed on October 2nd.

355.—**Burns of the palm of the right hand and contusion of the left buttock**:—I. Hamada, aged 24, a member of the magazine party of the Matsushima, in the battle of the Yellow sea, was conveying shells in the fore part of the lower deck, when a hostile shell burst on the same deck. At the moment, the powder provided for the side-guns exploded, by the flame of the powder he received burns of the 1st degree on the palm of the right hand, contusion of the left gluteal region by a wooden splinter. To the burns oiled lint was applied, and spirits of camphor to the contusion. On the 24th, he had completely recovered.

356.—**Burns of the back and abrasion of the scalp**:—C. Murata, aged 24, a member of the magazine party of the Matsushima, in the battle of the Yellow sea, was hauling up shells from the magazine in the fore part, when a hostile shell burst in the fore part of the lower deck. At the same time, the ammunition provided for the side-guns exploded, by the flame of explosion he sustained burns on the back, and an abrasion on the left parietal region by a flying shell fragment. Being temporarily treated on board, the injured man was admitted to the Sasebo Naval Hospital on the 20th. At the time of admission, the burns on the back had blisters here and there, and the epidermis stripped off exposing sore surfaces from whence serum was oozing. The shell-wound on the left parietal region was of a round shape and superficial and a healthy granulation had developed. The burns were dressed with wet boracic gauze, and the scalp wound with sublimate gauze. Progress was favorable, and the patient completely recovered on October 5th.

357.—**Burns of the thighs**:—G. Senokuchi, aged 22, a member of the magazine party of the Matsushima, in the battle of the Yellow sea, was hauling up shells in the fore magazine, when a hostile shell burst in the fore part of the lower deck ; at the same time igniting the ammunitions provided for the side-guns, he sustained by the explosion flame, burns of the 1st or 2nd degree on the inner sides of both thighs. They were dressed with oiled lint and completely healed on October 3rd.

258.—**Burns of the right leg**:—T. Onodera, aged 29, one of the gun-crew of Yoshino, in the battle of the Yellow sea, was standing by No. 8 gun on the port side of the quarter deck, when a hostile shell entered piercing through the starboard netting, and exploded against the 12 c. m. shells placed along the netting. By the flame of the explosion, he received burns of the 2nd degree on the lower third of the right leg to the dorsum of the foot. The burns were dressed with oiled lint and he was admitted, on the 26th, to the Sasebo Naval Hospital. At the time, the burns were exposing the congested true skin ; the epidermis having been stripped off and oozing serous effusion. Dressed with wet boracic gauze, he was, on the 30th, transferred to the Kure Naval Hospital. He made favorable progress, the burns completely healed and he returned to service on the 23rd of October.

10.—SCALD.

359.—**Scald of the whole body**:—K. Nakatsuma, aged 41, non-commissioned engineer of the No. 9 torpedo boat.

360.—H. Goto, aged 28, a senior stoker of the same boat as above.

361.—M. Mayeyama, aged 24, a stoker of the same boat.

362.—C. Tsunamoto, aged 24, a stoker of the same boat.

363.—T. Ito, aged 24, a stoker of the same boat.

The foregoing cases occurred on the same torpedo-boat on February 4th, 1895, when she ventured into the port of Wei-hai-wei taking the advantage of the dead of night to make an attack on hostile vessels. They were working in the engine-room, under a shower of the enemy's shells, the boat received 13 of them, of which one that struck the boat at 4. 30 at dawn next morning, entered by the port side and piercing the upper part of the boiler made a large hole of 9 inches in diameter. Steam and boiling water gushed out from this hole scalding all of them to instant death.

364.—I. Ajisono, aged 23, a stoker of the same boat as above. He was scalded together with others in the boiler room by gushing steam and boiling water through the rent in the boiler. He was rescued by No. 19. torpedo boat, from which he was at 6. 35 a. m. transferred to the mother-ship Omi-maru. Examined by the surgeon of the ship, he was found scalded all over the body ; the face, neck, chest, forearms and legs sustained scalds of the 2nd degree, the epidermis being softened and exfoliating here and there, or blistered at places. The back, abdomen, upper arms, thighs presented a reddish hue having wrinkles owing to the softening of epidermis. He complained of intense thirst and chilliness with alarming signs of collapse. Brandy was given and wet boracic acid packing applied. About 11 a. m. his suffering increased, he was rolling about in bed, and opium was given, at 7 p. m., dyspnœa set in, heart action failed, pulse became thready and occasional delirium supervened. At 3.30 a. m. on the 6th, the symptoms became worse, respiration stertorous, pulse indistinguishable, the mind stupified and responses unintelligible. Stimulating measures were resorted to in vain, and the patient expired at 4 o'clock in the morning.

365.—**Scalds of the face, hands and legs** :—G. Takahashi, aged 28, senior stoker of the same boat as above. He sustained scalds of 2nd degree with the same fate as above, on the face, ear-lobes, hands and legs. Rescued by No. 19 torpedo-boat that accompanied her, he was placed at 6.35 a.m. on board the mother ship Omi-maru. Examined by the surgeon of the ship, epidermis of the scalded parts was softened and stripped off at places. The parts were painted with olive oil and dressed with sublimate gauze. On the 6th, dressings were renewed, and blisters opened. The patient was transferred to the hospital ship Kobe-maru, and on the 7th, the epidermis of the affected parts became grayish black and contained serum or pus beneath it. Accordingly the sloughed epidermis was snipped off and the parts washed with boracic lotion and dressed with wet boracic gauze. The temperature rose to 37°.6 C. On the 8th, the face became œdematous, and the forehead slightly suppurated, the temperature indicated 38° C. Dressing was changed. On the 13th, the affected parts having almost entirely cast off the epidermis exposed the true skin which discharged copiously, but the temperature oscillated between 37°.5 C. and 37°.6 C. On the 20th, the patient was admitted to the Sasebo Naval Hospital. At the time of his admission, the scalded parts were denuded of epidermis actually forming ulcers with discharge. The former treatment was continued. On the 27th, pus discharge began to diminish greatly, and new epidermis developed from the margins of the scald. Boracic ointment was substituted. By March 8th, the epidermis completely formed over the scalded surfaces, but the cicatrix presented here and there a keloid appearance. In the middle of April, patches of a red-brown colour appeared on the face; and a small cicatrix on the inner canthus of each eye, and keloid cicatrices were formed on the back of hands and fingers, inner and outer sides of the right leg, so that an ugly appearance was left in these parts. However, the limbs and other parts being sound in their function, he returned to service on May 6th.

366.—**Scald of the right leg**:—E. Eiju, aged 30, a stoker of the same boat as above sustained scald of 1st degree in the lower third of the right leg. He was rescued by No. 19 torpedo boat and transferred on board the mother ship Omi-maru. He was dressed by the surgeon of the mother ship with olive oil and sublimate gauze. The scalded parts dried without suppuration and completely healed on the 11th of the same month.

11.—FROST-BITE.

367.—**Death by extreme cold**:—K. Okimoto, aged 32, a seaman of the No. 22 torpedo boat, on February 4th, 1895, availing herself of the depth of night, the boat attempted to enter the port of Wei-hai-wei and made an attack on the hostile vessels. On her way back, at 5 a. m. she ran aground just below the fort of Liubyoshi so firmly that floating her off was hopeless. The crew therefore got on a lifeboat and were making for the land when the boat capsized. Falling into the sea, he swam ashore and reached the occupied fort of Lokkakushi, but the time being the coldest season, he was frozen to death before medical relief could be afforded.

368.—**Frost-bite and contusion**:—U. Teshima, aged 27, crew of No. 22 torpedo boat, met with the same fate as the above man. Falling into the sea, he swam ashore as best he could, from whence despite the difficulty of walking on account of his frozen limbs he contrived by creeping along to get to our occupied fort of Lokkakushi. On the way, he often fell from prostration receiving severe bruises, but mustering all his strength, he arrived at the fort when he was given relief by surgeons of the 23rd regiment of the infantry, and on the same day was admitted to the 2nd Permanent Army Hospital at Kosan-go. The back, loins, gluteal regions and legs had pains; the lower limbs lost power which disabled him from standing; the fingers of both hands lost their movements, and were slightly swollen and tender on pressure; the toes were somewhat swollen from determination of blood. Spirit of camphor was rubbed on the affected parts, and the patient was kept warm and at rest. On the 9th, symptoms improving a little, he was removed on board a transport and on the 18th admitted to the Army Hospital at Hiroshima. At the time of his admission, he was found still impaired in nutrition, temperature 35°.6 C., pulse 60, appetite impaired, bowels constipated, pain at several parts of the head, which he said to be severest in the forehead and the right temple. As to the chest, dull pain was felt along the outer margin of the right pectoralis major and in the left 2nd intercostal space, which was increased by deep inspiration. On the back, the pain was felt on percussion in the left inter-scapular region, and over the 6th, 7th and 8th dorsal vertebræ, and all over the sacrum. Also pain was felt in the shoulder and the elbow joints; the fingers of both hands except the thumbs had anæsthesia and paresis with lingering determination of blood and swelling; the legs had pains in the calves; both feet had pains also and the toes were numbed; the patellar reflex was strikingly increased, and walking was very difficult. Under suitable treatment in the hospital, he recovered greatly and was on March 10th transferred to the Kure Naval Hospital. At that time, nutrition was greatly restored; temperature and pulse returned to normal condition; the fingers and toes were cold and slightly congested, and the skin of the palmar surface of the index, middle, and ring fingers, was stretched tightly and excessively sensitive, even mere touch gave severe pain. The pain in both calves, and dull pain in the right side of chest was still lingering slightly. Warm bath, friction of the skin with stimulating liniment and tonic and nutritious diets were chiefly resorted to, and on April 2nd, completely recovered, he returned to service.

12.—DROWNING.

369.—**Death by drowning**:—T. Suzuki, aged 28, Sub-lieutenant on No. 22 torpedo-boat, on February 4th, 1895, the boat availing herself of the dead of night, ventured into the port of Wei-hai-wei and made an attack upon the enemy's vessels. On the way back, the boat got aground at the foot of Liubyoshi. Finding it hopeless to rescue the boat, he jumped into the water and attempted to reach the shore, but it being just the coldest season of the year, he lost the use of his limbs, and was drowned.

370.—U. Furuichi, aged 27, a seaman of the No. 22 torpedo-boat met with the same fate with his superior officer above mentioned.

371.—R. Ono, aged 23, a stoker of No. 22 torpedo boat was drowned by the same cause as above.

CHAPTER III.

STATISTICS OF INJURIES.

The total number of the killed and wounded in the late war between Japan and China was 371, of which 6 cases occurred in the battle of Phung-do, 298 at the Yellow sea, 66 at Wei-hai-wei and 1 at the Pescadores. The six cases in the battle of Phung-do were not attributable to hostile shells, but to the shock of their own guns at the time of firing, or to the gas produced by the explosion of the gunpowder, and one man at the fight of the Pescadores was wounded by an enemy's bullet while serving as a landing party ashore, so in these two engagements none on board our war-ships sustained any injury. We do not therefore see any necessity to record these seven cases in a separate statistic. The statistics recorded in the present chapter will only refer to the killed and wounded in the battles of the Yellow sea and Wei-hai-wei.

1.—ON THE BATTLE OF THE YELLOW SEA.

The number of hostile shells received by our several war-vessels during the engagement of the Yellow sea is as follows :—13 by the Matsushima, 8 each by the Itsukushima, Fuso, and Yoshino, 11 by the Hashidate, 3 by the Chiyoda, 23 by the Hiyei, 9 by the Naniwa, 5 by the Takachiho, 4 by the Akitsushima, 30 by the Akagi, and 12 by the Saikyo-maru. The number of the killed and injured by these shells were as follows :—113 in the Matsushima, 26 in the Itsukushima, 12 in the Hashidate, 14 in the Fuso, 55 in the Hiyei, 10 in the Yoshino, 2 in the Takachiho, 14 in the Akitsushima, 28 in the Akagi, 11 in the Saikyo-maru, Besides these, there were some wounded otherwise than by shells : that is, 5 in the Itsukushima, 1 each in the Hashidate, Hiyei, Takachiho, and Akitsushima, and 2 each in the Yoshino and Naniwa. The statistics concerning them are the following.

TABLE NO. I.—NUMBER OF KILLED AND WOUNDED ARRANGED ACCORDING TO VESSELS.

VESSELS	COMPLEMENTS	KILLED	WOUNDED	TOTAL OF KILLED OR WOUNDED	PERCENTAGE OF K. OR W. PER COMPLEMENTS
Matsushima	425	35	78	113	26.59
Itsukushima	362	13	18	31	8.56
Hashidate...	362	3	10	13	3.59
Fuso	353	2	12	14	3.97
Chiyoda	313	...	...	...	...
Hiyei...	308	19	37	56	18.18
Yoshino	419	1	11	12	2.86
Naniwa	358	...	2	2	0.56
Takachiho...	359	1	2	3	0.84
Akitsushima	320	5	10	15	4.69
Akagi...	129	11	17	28	21.71
Saikyo-maru	118	...	11	11	9.32
Total...	3,826	90	208	298	7.79

As shown in table No. 1, considering from the totals of the killed and wounded, the Matsushima stands first, the Hiyei second, the Itsukushima third, the Akagi fourth, the Akitsushima fifth, the Fuso sixth, the Hashidate seventh, the Yoshino eighth, the Saikyo-maru ninth, the Takachiho tenth, and the Naniwa eleventh ; considered however, by the ratio of the killed and wounded to every hundred of force, the order must be considerably altered ; that is, the Matsushima stands first, the Akagi second and the Hiyei third, then come in order the Saikyo-maru, Itsukushima, Akitsushima, Fuso, Hashidate, Yoshino, Takachiho, Naniwa ; amongst them, the Matsushima, Akagi and Hiyei are strikingly high, while the Chiyoda had none of her inmates killed or wounded.

TABLE NO. II.—NUMBER OF KILLED AND INJURED CLASSIFIED ACCORDING TO RANKS. (A)

Ranks. / Vessels.		Officers.	Engineers.	Surgeons.	Paymasters.	Total.	Seamen.	Stokers.	Medical attendants	Paymaster's assistants.	Total.	Grand total.
Matsushima	Kil....	2	...	...	...	2	33	...	...	...	33	35
	Inj....	6	...	1	...	7	63	3	...	5	71	78
Itsukushima	Kil....	...	...	...	...	...	9	3	...	1	13	13
	Inj....	...	1	...	...	1	12	4	...	1	17	18
Hashidate ...	Kil....	2	...	...	...	2	1	...	...	...	1	3
	Inj....	1	...	...	...	1	7	...	1	1	9	10
Fuso	Kil...	...	...	...	...	...	2	...	...	...	2	2
	Inj....	2	...	...	...	2	10	...	...	...	10	12
Hiyei	Kil....	...	...	2	1	3	13	1	1	1	16	19
	Inj....	4	...	...	...	4	25	3	2	3	33	37
Yoshino ...	Kil....	...	...	...	...	...	1	...	...	...	1	1
	Inj....	2	...	...	...	2	8	...	1	...	9	11
Naniwa ...	Kil....	...	...	...	...	...	...	...	...	...	...	...
	Inj....	1	...	...	...	1	...	1	...	...	1	2
Takachiho ...	Kil....	...	...	...	...	...	1	...	...	...	1	1
	Inj....	...	...	...	...	...	1	...	...	1	2	2
Akitsushima	Kil....	1	...	...	...	1	4	...	...	...	4	5
	Inj....	...	...	...	...	...	8	2	...	...	10	10
Akagi... ...	Kil....	2	...	...	...	2	8	...	...	1	9	11
	Inj....	2	...	...	...	2	14	1	...	...	15	17
Saikyo-maru	Kil....	...	...	...	...	...	...	...	...	...	...	...
	Inj....	...	...	1	...	1	7	3	...	...	10	11
General Total	Kil.	7	...	2	1	10	72	4	1	3	80	90
	Inj.	18	1	2	...	21	155	17	4	11	187	208

TABLE NO. III.—NUMBER OF KILLED AND WOUNDED CLASSIFIED ACCORDING TO RANKS. (B)

	Ranks.	Number.	Killed.	Wounded.	Total of kil. and wounded.	Ratio of kil. and wounded per 100 of force.
Officers and Warrant Officers.	Officers ...	251	7	18	25	9.96
	Engineers ...	93	...	1	1	1.08
	Surgeons ...	26	2	2	4	15 38
	Paymasters...	26	1	..	1	3.85
	Total	396	10	21	31	7.83
Petty Officers, Seamen and Noncombatants.	Seamen ...	2,375	72	155	227	9.56
	Stokers ...	818	4	17	21	2.57
	Medical Attendants...	34	1	4	5	14.71
	Paymaster's Assistants ...	203	3	11	14	6.90
	Total	3,430	80	187	267	7.78
Grand total.		3,826	90	208	298	7.79

Tables Nos. 2 and 3 are formed in order to investigate the relation of death and injury rates to ranks. Table No. 2 is formed on each vessel, but table No. 3 on the aggregate numbers of respective ranks on board all the vessels, under the two great divisions of 'Officers and Warrant Officers,' and 'Petty Officers, Seamen, and Noncombatants,' of which the former is subdivided into Officers, Engineers, Surgeons and Paymasters, and the latter into Seamen, Stokers, Medical attendants and Paymaster's assistants, so that the ratio of the killed and wounded in the respective rank may be compared. Thus we see that under the head of 'Officers and Warrant Officers,' the actual number of the killed and wounded is greatest in Officers, followed by Surgeons, Engineers and Paymasters having only 1 each; under the head of 'Petty Officers, Seamen and Non-combatants,' Seamen come the first followed successively by Stokers and Paymaster's assistants, Medical attendants having the least number. These ranks, however, having originally very different numbers of their own, the true rates of injuries can not be ascertained unless considered in comparison with the number of each rank, so in the foot column of table 3 the rate percent of the killed and wounded to the whole number of each rank is computed; and from this we learn that both under the heads of 'Officers and Warrant Officers' and 'Petty Officers, Seamen and Noncombatants,' Surgeons and Medical attendants have the largest rate; next come Officers and Seamen, then Paymasters and their assistants, Engineers and Stokers having the smallest rate.

In naval battles, hostile shells do not choose any one place for striking a ship above the water-line: those who are standing on the bridge, or those who are fighting on an open battery or those who are at work on a lower deck, run an equal risk of being struck. So there is no reason for supposing that there would be any difference in the number of injuries between combatants and noncombatants, as long as they are equally engaged in their duties above the water-line. Thus in the battle of the Yellow sea, the surgeons who were mostly on the lower deck had a comparatively great number of killed and wounded, and the combatant officers and seamen who stand next to them in degree of injuries had likewise a large number of wounded on the lower deck. On the other hand, below the water-line, one is almost always safe, and the only shell that struck below the water line was that which reached the Naniwa (this knocked through the ship at about 1 foot below the water line and exploding there the fragments entered the coalbunker without inflicting any injury to person). It is therefore natural that the engineers and stokers who are always engaged below the water line were the least injured. It is true that six of the magazine men in the Hiyei and five of the stokers in the Itsukushima, who all were working below the water line were at once killed or wounded : the former because the fragments of a shell that had exploded on a lower deck, fell in the cock-pit at the entrance of the magazine, and the latter because a shell which had pierced through the middle part of the starboard side, and come through the coal-bunker, hit the ladder set against the middle steps of the engine room and there exploded. No injury, however, to life was sustained from any shell that knocked directly through the ships below the water line.

TABLE NO. IV.—SHOWING THE RATIO OF THE KILLED AND WOUNDED TO THE NUMBER OF SHELLS RECEIVED.

Vessels.	Number of the shells received.				Killed.	Wounded.	Total of killed and wounded.	Ratio of killed and wounded to each shell received.
	Exploded.	Not exploded.	Fragments.	Total.				
Matsushima	6	7	...	13	35	78	113	8.69
Itsukushima	6	2	...	8	13	13	26	3.25
Hashidate	4	7	...	11	3	9	12	1.09
Fuso	4	4	...	8	2	12	14	1.75
Chiyoda...	...	3	...	3	...	...	...	...
Hiyei	3	12	8	23	19	36	55	2.39
Yoshino...	2	1	5	8	1	9	10	1.25
Naniwa	...	3	6	9	...	...	...	...
Takachiho	1	4	...	5	1	1	2	0.40
Akitsushima... ...	1	3	...	4	5	9	14	3.50
Akagi	4	18	8	30	11	17	28	0.93
Saikyo-maru... ...	3	9	...	12	...	11	11	0.92
Total	34	73	27	134	90	195	285	2.13

Besides the killed and wounded mentioned in this table, there are the following cases due to causes other than hostile shells :—

5 in the Itsukushima, 2 each in the Yoshino and Naniwa, 1 each in the Hashidate, Hiyei, Takachiho and Akitsushima, numbering 13 in all. These are however, omitted, as they have no relation to the ratio of the killed and wounded to the number of the shells received.

As will be seen from table No. 4, if we name the ships in order of the ratio of their killed and wounded to the number of shells received, the Matsushima stands foremost, followed successively by the Akitsushima, Itsukushima, Hiyei, Fuso, Yoshino, Hashidate, Akagi, Saikyo-maru, and Takachiho, while the Naniwa and Chiyoda sustained no injury to life from enemy's shells. But if we consider merely the number of the shells received, the Akagi has the largest number, the Hiyei, Matsushima, Saikyo-maru, Hashidate and Naniwa succeeding; then the Itsukushima, Fuso, and Yoshino, these three having the same number, after which the Takachiho, Akitsushima, Chiyoda follow in order. As however the rate of the killed and wounded bears no exact proportion with the number of shells received, we are presented with a phenemenon such as is shown by the 'ratio of the killed and wounded to each shell received.' This is attributable to the fact that the shells received were of various sorts, some being those of heavy guns and some of light guns, of which some exploded while others did not; and also some that were no more than mere fragments, so that the degrees of damages sustained were very different. The case in which the heaviest damages were inflicted and the largest number were killed and injured at a time by the explosion of a shell, was that of a 30.5 c.m. shell that exploded on the lower deck of the Matsushima, by which 30 were killed outright and 70 injured at once (about half the number by explosion of the ammunition of the ship). A shell that exploded in the wardroom of the Hiyei killed 14 and wounded 26; a 21 c.m. ordinary shell that burst on the upper deck of the Akitsushima killed 5 and wounded 8; a similar shell that burst in the fore torpedo room of the Itsukushima killed 8 and injured 3. And in the Itsukushima even the explosion of a 50 m.m. light-gun shot killed 4 and hurt 6. On the contrary, a 30.5 c.m. shell that fairly struck the Saikyo-maru, and a 21 c.m. shell that hit the Chiyoda did not inflict any striking damages other than piercing the hull, on account of their not having exploded. Another remarkable example of this kind is seen in the case of a 15 c.m. steel shell that fairly struck the Yoshino in the battle of Phung-do. After piercing through the deck-house on the upper deck, it fell into the engine-room and after rolling about for a while among the persons in the engine room, it came to rest without exploding, inflicting no injury to any one. Again the fact that the number of the killed and wounded does not bear exact proportion with that of the explosions of shells received, is to be accounted for by the fact that damages so done greatly depend on the place hit by shells. This will be learned from the two following tables.

TABLE NO. V.—CLASSIFICATION OF THE PLACES STRUCK BY SHELLS IN EACH VESSEL.

Places. / Vessels.	Fore part.				Middle part.				After part.				Total.			
	Higher than upper deck.	Upper deck.	Middle and lower deck.	Lower than water line.	Higher than upper deck.	Upper deck.	Middle and lower deck.	Lower than water line.	Higher than upper deck.	Upper deck.	Middle and lower deck.	Lower than water line.	Higher than upper deck.	Upper deck.	Middle and lower deck.	Lower than water line.
Matsushima ...	...	...	2	...	5	...	4	...	...	1	1	...	5	1	7	...
Itsukushima ...	...	1	2	...	2	...	2	...	...	1	...	...	2	2	4	...
Hashidate... ...	2	1	...	...	4	1	2	...	...	...	1	...	6	2	3	...
Fuso	...	...	1	...	3	1	...	...	2	...	1	...	5	1	2	...
Chiyoda	...	1	...	...	...	...	1	...	...	1	...	...	...	2	1	...
Hiyei...	1	1	...	...	5	4	1	...	3	5	3	...	9	10	4	...
Yoshino	...	...	1	...	3	...	2	...	...	1	1	...	3	1	4	...
Naniwa	...	1	1	1	1	...	1	...	...	1	3	...	1	2	5	1
Takachiho ...	...	...	1	...	...	...	...	...	1	...	3	...	1	...	4	...
Akitsushima ...	1	...	...	...	...	2	...	...	1	...	...	...	2	2	...	...
Akagi...	4	3	1	...	7	4	1	...	2	8	...	...	13	15	2	...
Saikyo-maru ...	1	...	...	...	2	...	...	...	1	6	2	...	4	6	2	...
Total	9	8	9	1	32	12	14	...	10	24	15	...	51	44	38	1

The terms ‘upper deck,’ and ‘middle and lower deck’ in this table do not mean that the shells hit exactly on them, but at about those heights.

TABLE NO. VI.—NUMBER OF THE KILLED AND WOUNDED IN EACH VESSEL ARRANGED ACCORDING TO PLACE.

PLACES. / VESSELS.	MATSUSHIMA.	ITSUKUSHIMA.	HASHIDATE.	FUSO.	CHIYODA.	HIYEI.	YOSHINO.	NANIWA.	TAKACHIHO.	AKITSUSHIMA.	AKAGI.	SAIKYO-MARU.	TOTAL.
Upper deck—													
Fore part of upper deck	15	11	5	1	...	2	1	...	...	1	5	3	44
Mid. part of upper deck	...	...	...	12	...	7	2	1	1	12	2	4	41
After part of upper deck	...	...	...	...	...	14	6	...	...	...	4	...	24
In the turret on the fore part of upper deck ...	...	...	7	...	...	...	...	...	...	...	...	...	7
In the turret on the after part of upper deck...	1	...	...	...	...	...	...	...	...	...	...	...	1
Lower deck—													
Fore part of lower deck	77	11	...	...	...	1	...	...	...	...	5	...	94
Mid. part of lower deck	12	...	...	...	...	3	...	...	...	...	...	...	15
After part of lower deck	...	...	...	...	...	22	1	...	2	...	...	...	25
Higher than upper deck—													
In conning tower	...	...	...	...	...	...	1	...	...	...	...	...	1
On the bridge	2	...	...	1	...	1	...	...	...	...	10	...	14
Poop-deck	...	..	...	...	...	...	...	...	...	1	...	...	1
Flying deck and uppermost deck	4	4	1	...	...	...	...	...	...	...	...	4	13
Fore top	...	...	...	...	...	...	...	...	...	...	2	...	2
Lower than water-line—													
Engine-room	2	...	...	...	...	...	...	1	...	1	...	...	4
Boiler-room	...	5	...	...	...	...	...	...	...	...	...	...	5
Entrance to the magazine below lower deck ...	...	...	...	...	...	6	...	...	...	...	...	...	6
Outside—													
Outside of the ship	...	...	...	...	...	...	1	..	...	...	...	...	1
Total	113	31	13	14	...	56	12	2	3	15	28	11	298

From the above table No. 5, we see that the part that sustained the greatest number of shells was 'higher than the upper deck,' which received no less than 51 shells, then comes the 'upper deck' which received 44, and lastly the 'middle and lower decks' which received 38. As for the part below the water-line, it received only 1 shell and that striking at about 1 foot below the line, was so weakened in its force that no remarkable damage was incurred except that some of the outer platings were pierced. To compute the proportional rate of shells received on the respective decks by percentage, 'higher than the upper decks' is 38.06 %, 'the upper decks' 32.84 %, the 'middle and lower decks' 28.36 %, and 'below the water-line' 0.75 %. The rate of the killed and wounded does not however bear exact proportion to the number of shells received. Thus as is shown in table No. 6, 134 persons (44.97 %) were either killed or injured on the lower decks, 117 (39.26 %) on the upper decks, 31(10.40 %) above the upper decks, 15 (5.03 %) below the water-line and 1 (0.34 %) at the place outside of the ship. This result is attributable to the fact that on the lower decks many a person is apt to be injured by broken pieces of the walls or of furniture, etc., which inflict damages known as indirect-shells, and partly to the fact that in the Matsushima a very large number was either killed or wounded by one shell that burst on the lower deck and caused the large amount of gunpowder lying there to explode. Even on the upper decks more persons were sometimes injured by indirect shells than by the direct ones, and the upper decks might have been the scenes of more numerous deaths and injuries than the lower decks, if it had not been that in the late naval battle the number of injuries on the upper deck turned out to be comparatively small on account of the explosion of the gun-powder on the lower deck of the Matsushima as mentioned above. Above the upper deck, it is natural that the injuries sustained were much fewer, for it is quite open with only few objects to be struck by shells ; and at the same time far fewer persons are stationed there. The few deaths and injuries below the water-line were caused, as mentioned already, by fragments that flew down from the shells exploding on the lower decks,—that is, at a place above the water-line.

TABLE NO. VII.—WOUNDS ARRANGED ACCORDING TO LOCALITY.

In tabulating the number of wounds according to locality, those caused by shells, shell-fragments and indirect shells will be first given in the next table A.

Table A.

Locality of injury.	Number of killed and wounded.	Percentage of killed and wounded according to locality.
The whole body	36	15.32
The head (inclusive of the face)	65	27.66
The neck	6	2.55
The chest and back	21	8.94
The abdomen and lumbar region	24	10.21
The upper limb (inclusive of the scapular reg.)	38	16.17
The lower limb (inclusive of the buttocks)...	45	19.15
Total	235	100.00

Injuries caused by the shocks of shell-explosions or of firing guns are as shown in the next table B.

Table B.

Localty of injury.	Number of kil. and inj.	Percentage of injuries according to locality.
The head	9	39.13
The chest and back	1	4.35
The abdomen and lumbar region	2	8.70
The upper limbs	7	30.44
The lower limbs	4	17.39
Total	23	100.00

The burns caused by the explosion of shells or gun-powder are as shown in the next table C.

Table C.

LOCALITY OF BURNS.	NUMBER OF KIL. AND INJ.	PERCENTAGE OF KIL. AND INJ. ACCORDING TO LOCALITY.
Greater part of the body	18	45.00
Several parts of the body...	18	45.00
The upper limbs	2	5.00
The lower limbs	2	5.00
Total	40	100.00

In the foregoing three tables A, B, C, when a man received several wounds, only the most severe wound is reckoned, to the exclusion of the rest. Many cases of injuries from shell fragments associated with burns are included in the table A. in order to show the locality of injuries. Among the injuries to the 'whole body' in table A. are counted various cases: e.g. cases in which the whole body being mutilated, no particular place of injury could be assigned; cases in which several parts of the body were wounded, so as to make it difficult to differentiate any particular locality, and also cases in which the whole body was thrown over-board by the explosion of shells. In the injuries to the head in table B. are included 8 cases of perforation of membrana tympani. And in the 'greater part of the body' in table C. are included those cases in which the total area of several burns of the body was so extensive as to cover more than one-third of the whole body, and the 'several parts of the body' includes cases in which the burns were so scattered that no particular place could be named.

The number of injuries caused by projectiles arranged according to locality is as shown in table A. from which we see that excepting the injury to the whole body, the head has the largest number, then in order come the lower limbs, the upper limbs, the abdomen and lumbar region, the chest and back; the neck ranking last. For past naval battles of Europe and America, we can obtain no statistics on this point. But for land battles, if those injuries where the localities were well ascertained are summed up and classified, for the Crimean

War, the Italian War, the Russo-Danish War, the Austro-Prussian War, the Civil War of America, the Franco-Prussian War and the 1st Division of our army in the Japan-China War, the results are as follows :—Wounded on the head are 50,818, on the trunk 86,618, on the upper limbs 141,418, on the lower limbs 148,547,–427,401 in all. To compute the percentage of respective injuries, the head has 11.89, the trunk 20.27, the upper limbs 33.09, the lower limbs 34.75. Those killed outright on the fields of battle are not counted in this number, as the localities of the injuries, received by those killed on the spot are often doubtful and can not be adduced as reliable evidence. However, if we venture a calculation about the killed as far as reports of such exist,—that is, about 118 killed in the New Zealand war of England, 387 in the Russo-Danish war, 1,173 in the American Civil war, and 119 of the 1st Division of our army in the Japan-China war—the percentage will be seen to be 40.24 of the head, 53.97 of the trunk, 1.79 of the upper limbs, 4.00 of the lower limbs. The proportion between the killed and wounded varies with each war. Thus in the battles of Alma and Inkerman in 1854 and the attack on Plevna in 1878, the number of the killed, and that of the wounded on the side of the Russians, was nearly equal, while with the French at the same battle of the Alma the rate was 8.3 of wounded to 1 of killed. Such variations will naturally occur according to the character of the battle and the nature of the field occupied. However, according to Longmore's calculation, based upon 100 battles, the average proportion of the killed and wounded is 1 of the former to 4 of the latter. If we calculate the foregoing numbers of the various injuries to the killed and of the wounded together, the percentage will be thus : injuries to head 17.56, trunk 27.01, upper limbs 26.83, lower limbs 28.60. Judging from mere figures, the lower limbs received the largest number of injuries, next the trunk and then the upper limbs, the head having the least number. Yet it is natural that the wider the area the higher the number of the shells received, and therefore in order to make a real comparison of the number of shells received, it is necessary that the area of the respective regions should be taken into account. The rate of the area of the respective regions apt to be struck by projectiles, according to Longmore, is 8.51 in the head (inclusive of the face and neck), 28.91 in the trunk, 21.14 in the upper limbs, 41.41 in the lower limbs. Comparing these with the number of shells received in each locality, we find the head stands comparatively higher than the rest, next the upper limbs, then the trunk and lastly the lower limbs. This difference may be accounted for by the fact, that in land fights the head and upper limbs have to be exposed to the enemy, while the lower half of the body is often protected by some kind of shelter. But on board war-ships there being scarcely any such things as parapets, jungles (thickets) or ditches to cover the lower part of the body, it would naturally be expected that the region that has the widest area should receive the greatest number of projectiles. Yet the fact is to the contrary, as is shown in the table 7, A. If we arrange the numbers into four groups; that is, head, trunk, upper and lower limbs, the injuries of the head will show 35.68 per cent, of the trunk 22.61, of the upper limbs 19.10, and of the lower limbs 22.61 respectively. Here we see that the head though it has the smallest area, shows the highest number of injuries, not only comparatively but actually, while the lower limbs, most extensive in area have a comparatively small number, so that the difference between them is more striking than it was even in the land fights. As regards the trunk and the upper limbs, the former somewhat exceeds the latter in its actual number of injuries, but making due allowance for their respective areas, the upper limbs have sustained a comparatively larger number of injuries. This subject will further be dwelt upon under the articles of tables Nos. 16, and 17, in the section of the attack on Wei-hai-wei in connection with the injuries sustained in that engagement.

TABLE NO. VIII.—CLASSIFICATION OF INJURIES ARRANGED ACCORDING TO THEIR TERMINATION.

Termination. Locality.		Instant death.	Sub-sequent death.	Cured.	Invalid-ed.	Total.
Greater part of the body ...	Actual num.	30	21	...	1	52
	Percentage.	57.69	40.38	...	1.92	99.99
Various parts of the body ...	Actual num.	...	...	15	5	20
	Percentage.	...	...	75.00	25.00	100.00
Head	Actual num.	23	3	16	1	43
	Percentage.	53.49	6.98	37.21	2.33	100.00
Face	Actual num.	...	...	24	5	29
	Percentage.	...	...	82.76	17.24	100.00
Neck	Actual num.	2	1	3	...	6
	Percentage.	33.33	16.67	50.00	...	100.00
Chest and back	Actual num.	8	1	14	...	23
	Percentage.	34.78	4.35	60.87	...	100.00
Abdomen and loins	Actual num.	18	3	5	...	26
	Percentage.	69.23	11.54	19.23	...	100.00
Upper limbs	Actual num.	...	1	39	10	50
	Percentage.	...	2.00	78.00	20.00	100.00
Lower limbs	Actual num.	9	3	31	6	49
	Percentage.	18.37	6.12	63.27	12.24	100.00
Total.	Actual num.	90	33	147	28	298
	Percentage.	30.20	11.07	49.33	9.40	100.00

When the termination of injuries pertaining to various localities are classified under four heads of 'Instant death,' 'Subsequent death,' 'Cured,' and 'Invalided' as in the table No. 8, we see that deaths —both instant and subsequent death—are most numerous in the column 'greater part of the body.' This can not be otherwise because as already mentioned, cases of mutilation of the whole body and of extensive burns are included in it. Now, to compute the percentage of each column from its actual number of deaths—in the first column 'greater part of the body' the instant deaths claim 57.69 per cent; the 'subsequent deaths' 40.38; excepting only one case of burns extending over one-third of the whole body, all the rest belong to this column, that is, 51 out of 52 proved fatal, showing a death rate of 98.08 per cent. The mortalities from injuries to other parts including both instant and subsequent deaths come as follows: abdomen and loins 80.77 per cent, head 60.47, neck 50.00, chest and back 39.13, lower limbs 24.49, upper limbs 2.00, various parts of the body and face no death, and 1 death in the column upper limbs was attributable to erysipelas from accidental infection.

Generally speaking, in engagements on land, the instant deaths owing to injuries of the chest and head are most numerous in their class; in the New Zealand war of England, among the instant deaths, injuries of the chest showed 50.00 per cent, of the head 33.90, of the abdomen 9.32, and of the neck and thighs 3.39 respectively. In the Prusso-Danish war, of instant deaths, the injuries of the chest take up 50.65 per cent, those of the head 30.23, of the abdomen 11.37, of the lower limbs 3.35, of the neck 2.07, of the back 1.81, of the upper limbs 0.51. Thus the rates of injuries belonging to the respective localities, are nearly the same in both wars. As the head and chest contain vital organs instant deaths resulting from injuries of these parts are naturally most numerous. The injuries of the abdomen are indeed likewise apt to be serious, but deaths from them, not being so instant as from those of the higher regions, will ensue mostly after some days. The cases of instant deaths in the 1st Division of our army in the Japan China war may be arranged as follows: the injuries of the head take up 50.42 per cent, of the neck 5.04, of the chest 31.93, of the abdomen 10.92, of the lower limb 1.68, thus only the difference in this war is the inversion of the rates of the head and chest injuries, all the rest remaining nearly the same in their rates. However, if we compute the percentage of death of respective regions of 90 instant deaths, we see it to be :—

Injuries of the whole body	33.33
Head injuries	25.56
Neck injuries	2.22
Chest injuries	8.89
Abdominal injuries	20.00
Injuries of lower limbs	10.00

From this we see that injuries so extensive as to affect the whole body are most numerous, and that instant deaths from the injuries of the abdomen and lower limbs hitherto comparatively few in land warfare, show pretty large figures. This is because in naval battles, injuries are mostly caused by shells or their fragments, or large iron or wooden splinters, which would inflict cruel injuries by severing structures and organs, unlike bullet wounds which merely make small perforations for the passage of the bullets.

The subsequent deaths that occurred during the course of treatment are 33, the percentage of which according to the respective localities is as follows :—

Injuries of the whole body	63.64
Head injuries	9.09
Neck injuries	3.03
Chest injuries	3.03
Abdominal injuries	9.09
Injuries of the upper limbs	3.03
Injuries of the lower limbs	9.09

Thus the injuries of the whole body possess the highest rate, next come in order those of the head, abdomen and lower limbs which have the same rate. When this table is compared with the 73 'subsequent deaths' which occurred in the 1st Division of our Army in the Japan-China war, the different percentages are as follows : the injuries of the head 16.44, of the neck 1.37, of the chest 28.77, of the abdomen 41.09, of the upper limbs 2.74, of the lower limbs 9.59, so that the abdominal injuries stand highest, and next come those of the chest and head, showing a great difference in the order of the proportional ratios of the injuries of respective localities. This is because as has already been said, in the case of a bullet wound, even in an internal organ, the apertures are not large. Unlike shell fragments, a bullet is not only very small, but has no irregular angles as the former, accordingly death does not follow instantly, but mostly comes gradually during the course of subsequent treatment. In the land fights of Europe and America in former years, deaths in the course of treatment as a rule were most numerous in the injuries of the abdomen, next in those of the chest. But viewed merely from the figures relating to deaths during treatment, those owing to the injuries of the lower and upper limbs were most numerous. This must be attributed to the fact that the actual number of injuries was greatest in these regions ; besides, on account of imperfect antiseptic methods, various infections resulted even in the wounds of the lower and upper limbs, which frequently proved fatal. Thus no proper comparison can be made with similar injuries at the present day.

Cases of recovery are 147 and the invalidings after recovery 28. In comparing the percentage of the following three results ; 'subsequent deaths' during treatment amount to15.87, 'recovered' to 70.67, and 'invalidings after recovery' to 13.46. Let us compare this with those of the English army in the Crimean war, of which, alone in foreign wars, there exists a report in which this kind of classification is made. The wounded cases taken into hospitals were 11,515, of which 1,775 *i.e.*, 15.41 per cent, died during treatment, 6,729 *i.e.*, 58.44 recovered, and 3,011 *i.e.*, 26.15 were invalided. We see that the rate of subsequent deaths during treatment is about the same as in our service, though the proportions of recovered and invalided are different. As the art of surgery is now much more advanced than it was in the time of the Crimean war, the number of deaths during treatment ought to have shown a great decrease in our army. This apparent similarity of the death rate is attributable to the difference in the nature of the injuries in land fights, and in naval battles on the one hand, and on the other to the fact that in our case, those who expired soon after being wounded were likewise counted under the heading of subsequent deaths, hence this apparent high rate of death. Under this heading of deaths, were counted in this table, not a few cases that died within twenty-four hours after injury. The following shows the time of deaths that occurred within four days of injury, before their admission into the Sasebo Naval Hospital thus :—

Those who died on the day of injury	3
Those who died within one day after injury ...	11
,, ,, two days ,, ,, ...	6
,, ,, three ,, ,, ,, ...	3
,, ,, four ,, ,, ,, ...	1

As will be seen from this, the 14 who died within 24 hours of injury form 42.42 per cent, of the 33 deaths during treatment, and if to this be added the 6 deaths that occurred within forty-eight hours of injury, we get 20 deaths, or 60.61 of the total deaths during treatment. The whole number of deaths that occurred before admission into the hospital was 24, which is 72.73 per cent of the total so called subsequent deaths during treatment. The deaths therefore that actually took place after admission into the hospital were only 9 (of these the wounded men from the Matsushima were admitted, some on the night of the 20th and the rest on the 21st). The conditions of the injuries and fatal terminations of the nine cases in the hospital were as follows :—

(a) Cases of extensive burns which extended over two-thirds of the whole body were 3, of whom 2 died in three days after admission and six days after injury, and 1 died in nine days after admission and twelve days after injury. (b) A case of a penetrating wound of the skull in which a shell fragment pierced into the brain above the right frontal eminence. This was superseded in its time by a cerebral abscess and was trephined but with no success. The patient died 53 days after the admission and 56 days after injury. (c) A case of a penetrating wound of the chest and abdomen in which a shell fragment pierced the chest and abdomen breaking in its course the left false ribs, and lacerating the addominal visceræ. The patient was already much exhausted owing to traumatic peritonitis when received into the hospital, and died five days after reception and nine days after the injury. (d) A case of a penetrating wound of the abdomen in which a shell fragment pierced into the cavity by the left side of the umbilicus, and perforated intestines in several places, causing leakage of their contents. This was followed by peritonitis and finally the patient succumbed to exhaustion 38 days after the admission and 41 days after the injury. (e) A case of a penetrating wound of the sacro-iliac joint in which a wooden splinter got wedged into the joint, and reached deep into the pelvic cavity, causing fracture of the bones, paraplegia and inflammation of the pelvic organ. The patient died from exhaustion thirteen days after the admission and seventeen days after the injury. (f) A case of compound fracture of the right humerus which was progressing favorably and had almost recovered, when unfortunately the patient was attacked with erysipelas, to which he finally succumbed, 179 days after admission and 181 days after the injury. (g) A case of comminuted fracture of the right femur at its upper part with severance of soft tissues. Amputation was performed at the upper part of the thigh but the patient died from the shock; surviving fifteen days after the injury. The following table shows the classification of injuries ending fatally:

TABLE NO. IX.—INJURIES WHICH ENDED FATALLY.

INJURIES.	INSTANT DEATHS.	SUBSEQUENT DEATHS.		TOTAL.
		BEFORE ADMISSION	AFTER ADMISSION.	
Mutilation of the whole body	28	...	...	28
Lacerated wounds of various parts of the body, and burns of the whole body ...	1	...	...	1
Extensive burns	1	18	3	22
Mutilation of the head	10	...	...	10
Penetrating wound of the skull...	9	1	1	11
Perforated wound of the skull	1	...	...	1
Compound fracture of the skull...	1	1	...	2
Compound fracture of the facial bones and base of cranium	2	...	...	2
Partial mutilation of the neck	1	...	...	1
Penetrating wound of the neck	1	...	...	1
Perforated wound of the neck	...	1	...	1
Partial mutilation of the chest	2	...	...	2
Partial mutilation of the chest and abdomen	1	...	...	1
Penetrating wound of the chest...	...	1	...	1

Penetrating wound of the chest and abdomen	...	...	1	1
Perforated wound of the chest	4	...	...	4
Perforated wound of the chest and abdomen	1	...	...	1
Partial mutilation of the abdominal wall	2	...	...	2
Mutilation of the abdominal and lumbar reg.	5	...	...	5
Penetrating wound of the abdomen	3	...	1	4
Perforated wound of the abdomen	2	...	...	2
Mutilation of the lower half of the body	2	...	...	2
Perforated wound of the loins	3	...	...	3
Compound fracture of the sacro-iliac joint	...	...	1	1
Mutilation of the right side of the pelvis and the right femur	1	...	...	1
Mutilation of the limbs with the burns of whole body	1	...	...	1
Partial mutilation of the upper and lower limbs with extensive burns	1	...	...	1
Compound fracture of the scapula and humerus	...	...	1	1
Mutilation of the thigh	4	...	...	4
Compound fracture of the femur	1	...	...	1
Perforated wound of thigh with fracture of the femur	1	...	1	2
Mutilation of both legs and left forearm	1	...	...	1
Mutilation of the leg	...	1	...	1
Perforated wound of leg with fracture of tibia and fibula	...	1	...	1
Total	90	24	9	123

Of the 28 cases of mutilation of the whole body in this table, all except two belonged to the Matsushima, and their limbs and trunks being blown about by the explosion of a hostile 30.5 c.m. shell, it was impossible to ascertain their identity. The names of the killed were ascertained after the investigation later on. Some of them are thought to have been blown into the sea through the gun port, but it is impossible to say definitely.

Of the 28 invalided cases, there are from the injuries of the upper limbs 10, of the lower limbs 6, of the various parts of the body and the face 5 each, of the greater part of the body and the head 1 each, and the percentage is, 35.71 from the injuries of the upper limbs, 21.43 of the lower limbs, 17.86 of the various parts of the body and the face respectively, 3.57 each of the greater part of the body and the head, and no invalidings from the injuries of the neck, chest, back, abdomen and loins. The proximate causes for invaliding were as follows :

(1) Extensive burns in which atrophy of the limbs and the ankylosis of the joints due to cicatricial contraction	1
(2) Burns of the various parts of the body followed by the contraction of the cicatrices...	3
(3) Burns of the various parts of the body followed by obstinate eczema owing to the derangement of the nutrition of the skin	1
(4) Burns of the various parts of the body followed by apathy.	1
(5) Compound fracture of the frontal bone accompanied with hæmorrhage in the left retina and resulting in the impairment of sight	1
(6) Compound fracture of the facial bones accompanied with detachment and hæmorrhage of the retina which resulted in the impairment of sight	2
(7) Contusion of the eyes which caused the hæmorrhage of the retina and the dislocation of the lens resulting in the impairment of sight	1
(8) Penetrating wound of the eye balls, for which enucleation of the one ball was performed	1

(9) Perforated wound of the right scapula, from which impairment of the movement of the shoulder joint and the atrophy of the upper limb resulted	1
(10) Perforated wounds of both humeri, in which paralysis of the right musculo-spiral nerve followed...	1
(11) Compound fracture of the right humerus followed by the ankylosis of the elbow joint	1
(12) Compound fracture of the left forearm, for which the amputation of the arm was performed	1
(13) Simple fractures of the right forearm and fingers by which the grasping power of the hand was impaired	1
(14) Mutilation of the right hand for which amputation was performed	1
(15) Compound fracture of the left hand for which resection of the metacarpus was performed	1
(16) Blind wounds of the right arm and the left forearm with compound fracture of the right hand, from which resulted the imperfect function of both hands	1
(17) Compound fracture of the left index-finger which was amputated	1
(18) Mutilation of the index and middle fingers	1
(19) Blind wound of the left thigh which was followed by atrophy, with the mutilation of the right middle finger	1
(20) Lacerated wound of the right leg followed by atrophy and contraction of the cicatrix	1
(21) Compound fracture of the right foot, for which resection of the metatarsus was performed	1
(22) Sprain of both ankle joints, in which chronic inflammation of the joints persisted	1

(23) Compound fracture of the left knee-joint, for which the amputation of the thigh was performed	1
(24) Compound fracture of the right knee-joint, resulting in ankylosis of the joint	1

If we compare the rates between deaths and invalidings according to respective regions of injuries, it will be seen that their proportion is reverse,—that is ; the rate of invalidings is small where that of deaths is large and vice versa. The injuries of the head, neck, chest, back, loins, and abdomen, were apt to be so serious as to cause instant death or death soon after injury, while those which healed were only superficial wounds and therefore the number of invalidings was small or none at all. On the other hand, in the injuries of the face and of the upper and lower limbs, the rate of deaths is comparatively small, and even serious wounds did not prove fatal owing to the recent progress in the surgical art, hence the greater number of invalidings from the resulting impairment of the functions of the injured parts. Cases of infections of the wounds were very few and only one unfortunately ended in erysipelas.

The percentage of 'Deaths before admission,' 'Deaths after admission,' 'Recoveries,' and 'Invalidings,' exclusive of those instantly killed is as follows :—

Deaths before admission	11.54
Deaths after admission	4.33
Recoveries...	70.67
Invalided	13.46

These rates will be again taken up after we have finished our consideration of the attack on Wei-hai-wei.

2.—OF ATTACK ON WEI-HAI-WEI.

The number of the shells that hit our ships during the attack on Wei-hai-wei was 1 each for the Matsushima, Hashidate, Yoshino, Naniwa, Akitsushima, Tsukushi, Fuso, Takao, Katsuragi, Musashi, Tenryu, and No. 6 torpedo-boat, 2 for the Yamato, 13 for No. 9 torpedo-boat, and 3 for the occupied Luchotsai fort. Cases of death or injuries caused by these shells were 3 in the Matsushima, 7 in the Yoshino, 2 in the Akitsushima, 8 in the Tsukushi, 7 each in the Fuso and Katsuragi, 11 in the Tenryu, 8 in No. 9 torpedo-boat, 7 in the Luchotsai fort. Besides these, there was 1 case in the Katsuragi and 5 in No. 22 torpedo-boat from other causes. The statistics are shown below.

TABLE NO. X.—KILLED AND WOUNDED ARRANGED ACCORDING TO VESSELS.

VESSELS.	FORCE ON BOARD.	KILLED.	WOUNDED.	TOTAL OF KILLED AND WOUNDED.	PERCENTAGE OF KILLED AND WOUNDED.
Matsushima	427	...	3	3	0.70
Itsukushima	364	...	...	...	...
Hashidate	363	...	...	..	...
Yoshino	422	2	5	7	1.66
Naniwa	361	...	...	...	...
Takachiho	360	...	...	...	...
Akitsushima	323	...	2	2	0.62
Chiyoda	315	...	...	.	...
Tsukushi	182	1	7	8	4.40
Banjo	107	...	...	...	...
Maya	105	...	...	...	...
Atago	106	...	...	...	...
Chokai	105	...	...	...	...
Akagi	128	...	...	...	...
Fuso	413	...	7	7	1.69
Hiyei	307	...	...	...	...
Kongo	307	...	..	...	...
Takao	228	...	...	...	...
Yamato	234	...	...	...	...
Katsuragi	234	1	7	8	3.42
Musashi	234	...	...	...	...

(*Continued over.*)

VESSELS.	FORCE ON BOARD.	KILLED.	WOUNDED.	TOTAL OF KILLED AND WOUNDED.	PERCENTAGE OF KILLED AND WOUNDED.
Tenryu	203	5	6	11	5.42
Kaimon	201	...	...	...	...
Kotaka	29	...	...	...	...
No. 5 torpedo-boat...	16	...	...	...	...
No. 6 „	16	...	...	...	...
No. 7 „	15	...	...	...	...
No. 8 „	16	...	...	...	...
No. 9 „	16	4	4	8	50.00
No. 10 „	17	...	...	...	...
No. 11 „	17	...	...	...	...
No. 12 „	16	...	...	...	...
No. 14 „	17	...	...	...	...
No. 18 „	16	...	...	...	...
No. 19 „	16	...	...	...	...
No. 21 „	18	...	...	...	...
No. 22 „	20	3	2	5	25.00
No. 23 „	20	...	...	...	...
Luchotsai fort and Landing party	62	4	3	7	11.29
Total.	6,356	20	46	66	1.04

The highest number of killed and wounded shown in table No. 10, occurred on the Tenryu ; then came the Tsukushi, Katsuragi and No. 9 torpedo-boat; the Yoshino, Fuso and Luchotsai fort came next, and No. 22 torpedo-boat, Matsushima Akitsushima last. However, if we compare the killed and wounded with the number of the force on board the respective vessels, the first in order is No. 9 torpedo-boat, the second No. 22 torpedo-boat, the third the Luchotsai fort, the fourth the Tenryu, the fifth the Tsukushi, the sixth the Katsuragi, the seventh the Fuso, the eighth the Yoshino, the ninth the Matsushima, the tenth the Akitsushima ; whilst in sixteen vessels, viz. the Itsukushima, Hashidate, Naniwa, Takachiho, Chiyoda, Banjo, Maya, Atago, Chokai, Akagi, Hiyei, Kongo, Takao, Yamato, Musashi, Kaimon, Kotaka, and twelve torpedo-boats no case of killed or wounded occurred.

TABLE NO. XI.—KILLED AND WOUNDED ARRANGED ACCORDING TO RANKS IN EACH VESSEL.

RANKS. / VESSELS.		OFFICERS.					PETTY OFFICERS, SEAMEN AND NON-COMBATANTS.					
		OFFICERS.	ENGINEERS.	SURGEONS.	PAYMASTERS	TOTAL.	SEAMEN.	STOKERS.	NURSES.	STEWARDS.	TOTAL.	GRAND TOTAL.
Matsushima	Kil...	...	...	...	...	...	...	...	...	...	...	...
	Inj ..	3	...	...	...	3	...	...	...	...	...	3
Yoshino	Kil...	...	...	...	...	...	2	...	...	...	2	2
	Inj...	...	...	...	...	...	5	...	...	...	5	5
Akitsushima	Kil...	...	...	...	...	...	...	...	...	...	...	...
	Inj...	...	...	...	...	...	2	...	...	...	2	2
Tsukushi ...	Kil...	...	...	...	...	...	1	...	...	...	1	1
	Inj...	1	...	...	1	2	4	...	...	1	5	7
Fuso	Kil...	...	...	...	...	...	...	...	...	...	...	...
	Inj...	...	...	...	...	...	6	...	...	1	7	7
Katsuragi ...	Kil...	...	...	...	...	...	1	...	...	...	1	1
	Inj...	1	...	...	...	1	6	...	...	...	6	7
Tenryu ...	Kil...	1	...	...	...	1	4	...	...	...	4	5
	Inj...	...	1	...	...	1	4	1	...	...	5	6
No. 9 torpedo-boat	Kil...	...	1	...	...	1	...	3	...	...	3	4
	Inj...	...	...	...	...	...	..	4	...	...	4	4
No. 22 boat	Kil...	1	...	...	...	1	1	1	...	...	2	3
	Inj...	...	...	...	...	...	2	...	...	...	2	2
Landing party to Luchotsai fort	Kil...	1	...	...	...	1	3	...	...	...	3	4
	Inj...	...	...	...	...	...	3	...	...	...	3	3
Total	Kil...	3	1	...	...	4	12	4	...	...	16	20
	Inj...	5	1	...	1	7	32	5	...	2	39	46

TABLE NO. XII.—KILLED AND WOUNDED ARRANGED ACCORDING TO RANKS.

		FORCE ON BOARD.	KILLED.	WOUNDED.	TOTAL OF KILLED AND WOUNDED.	PERCENTAGE OF KILLED AND WOUNDED.
OFFICERS.	Officers	451	3	5	8	1.77
	Engineers ...	167	1	1	2	1.20
	Surgeons ...	45	...	...	...	...
	Paymasters ...	48	...	1	1	2.08
	Total	711	4	7	11	1.55
PETTY OFFICERS, SEAMEN AND NON-COMBATANTS.	Seamen	3,945	12	32	44	1.12
	Stokers	1,299	4	5	9	0.69
	Nurses	52	...	...	...	...
	Stewards ...	349	...	2	2	0.57
	Total	5,645	16	39	55	0.97
	Grand total...	6,356	20	46	66	1.04

In the above tables, the highest actual number of killed and wounded arranged according to ranks is seamen, next come stokers, then officers, engineers, stewards, and paymasters; no case of killed or wounded occurred among surgeons and nurses. Again the percentage of the killed and wounded according to the number of force in each rank, shows more or less difference in each column as shown in the foregoing tables, yet not so great a difference as in the battle of the Yellow sea. The killed and wounded in the attack on Wei-hei-wai as will be clearly seen from table No. 15, were most frequent among those stationed on the upper decks, while those on the lower decks sustained very few injuries. In the battle of the Yellow sea which was an action between vessels, the shells that hit the ships' sides were most numerous, owing to the extended low range of the projectiles. Thus every part of the ship above the water line, whether on the upper or the lower deck, was equally struck, so that those stationed on the lower deck were injured as well as those on the upper deck. Thus, the number of killed and wounded entirely depended on the number of the persons stationed at any place that was hit. On the contrary, during the attack on the Wei-hai-wei forts, the hostile shells mostly came aboard at an acute angle, accordingly places above the upper deck were mostly struck ; the only shell that pierced through the lower deck being one on the Naniwa (the shells that struck the torpedo-boats came from the hostile vessels near by and are not included in the above). Hence the high casualty among those stationed on the upper deck. The unusual high number of casualties among the stokers was because No. 9 torpedo boat had its boiler broken by a hostile shell during the night attack on Wei-hai-wei, 8 stokers were killed or wounded at one time.

TABLE NO. XIII.—RATIO OF THE KILLED AND WOUNDED TO THE NUMBER OF SHELLS RECEIVED.

VESSELS.	NUMBER OF SHELLS RECEIVED.				KILLED.	WOUNDED.	TOTAL OF KILLED AND WOUNDED.	NUMBER OF KILLED AND WOUNDED PER SHELL.
	EXPLODED.	NOT EXPLODED.	FRAGMENTS OF SHELL.	TOTAL.				
Matsushima ...	...	1	...	1	...	3	3	3.00
Hashidate	...	...	1	1	...	...	...	0.00
Yoshino	...	1	...	1	2	5	7	7.00
Naniwa	...	1	...	1	...	...	...	0.00
Akitsushima ...	1	...	...	1	...	2	2	2.00
Tsukushi	...	1	...	1	1	7	8	8.00
Fuso	1	...	...	1	...	7	7	7.00
Takao	...	1	...	1	...	...	...	0.00
Yamato	2	...	...	2	...	...	...	0.00
Katsuragi	1	...	...	1	1	6	7	7.00
Musashi	...	1	...	1	...	...	...	0.00
Tenryu	1	...	...	1	5	6	11	11.00
No. 6 torpedo-boat	...	1	...	1	...	...	...	0.00
No. 9 boat	...	13	...	13	4	4	8	0.62
Luchotsai fort ...	3	...	...	3	4	3	7	2.33
Total	9	20	1	30	17	43	60	2.00

Besides those stated in the above table, there was one casualty in the Katsuragi and five in No. 22 torpedo-boat, but these were due to other causes than shells, hence they are omitted here.

The ratio of the killed and wounded in each vessel, with the number of the shells received, was highest in the Tenryu (11.00 killed or wounded per shell) ; next came the Tsukushi (8.00); next the Yoshino, Fuso, and Katsuragi (7.00 each); next the Matsushima (3.00); then in the Luchotsai fortress (2.33); the Akitsushima (2.00); No. 9 torpedo-boat (0.62), while shells that hit the Hashidate, Naniwa, Takao, Musashi, and No. 6 torpedo-boat were harmless. Two of the shells also that struck the Yamato caused no casualty. The number of killed and wounded depends firstly on the explosion or non-explosion of the shell, secondly on the place hit by a shell, whether the planks, gun barrels, gun shields and other implements were or were not smashed to pieces and thrown about. The casualties caused by the explosion of shells were on the Akitsushima, Fuso, Katsuragi, Tenryu, and in the Luchotsai fort, while in the Matsushima, Yoshino, and Tsukushi, they were caused by broken planks or gun shields, and in No. 9 torpedo-boat by the bursting of the boiler. The relation of killed and wounded to the place struck by shell will further be shown in the following two tables.

Of the vessels struck by shells, the Hashidate had the cover of her fore torpedo tube damaged by a fragment of shell. The lower deck of the Naniwa was pierced in the waist, but happily none of the crew of either vessel sustained any injury ; the Takao merely had the middle part of the main-rigging rent asunder by a shell; the Yamato received two shells, one on the machine-gun on the ship's bridge, and one in the starboard galley ; but fortunately, they did not explode but fell overboard, together with the broken iron and wooden splinters, so that no person was injured by flying pieces ; the Musashi practically escaped injury, for she only had a shell fly over her, tearing the starboard main-brace on its way ; No. 6 torpedo-boat had its boiler room pierced by a machine gun-shot, but none of the crew were hurt.

TABLE NO. XIV.—PLACE OF VESSELS HIT BY SHELLS.

PLACE. / NAME OF SHIP.	FORE PART.				MIDDLE PART.				AFTER PART.				TOTAL.			
	ABOVE THE UPPER DECK.	UPPER DECK.	MID. & LOW. DECKS.	BELOW THE WATER-LINE.	ABOVE THE UPPER DECK.	UPPER DECK.	MID. & LOW. DECKS.	BELOW THE WATER-LINE.	ABOVE THE UPPER DECK.	UPPER DECK.	MID. & LOW. DECKS.	BELOW THE WATER-LINE.	ABOVE THE UPPER DECK.	UPPER DECK.	MID. & LOW. DECKS.	BELOW THE WATER-LINE.
Matsushima	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...
Hashidate	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...
Yoshino	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...
Naniwa	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...
Akitsushima	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...
Tsukushi...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...
Fuso	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...
Takao	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...
Yamato	...	...	...	...	...	...	...	...	2	...	...	...	2	...	...	...
Katsuragi	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...
Musashi	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...
Tenryu	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...
No. 6 torpedo-boat...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	.
No. 9 torpedo-boat...	...	1	1	...	6	2	3	...	...	...	...	...	6	3	4	...
Total	2	2	2	...	9	4	5	...	3	...	...	...	14	6	7	...

Besides those stated in the table, the Kotaka (a torpedo-boat) received 2 musket bullets; No. 6 torpedo-boat sixty; No. 10 torpedo-boat ten; and No. 23 torpedo-boat four bullets, but no mention is made of them in the table as no particular damage was done.

As will be seen in the table, the parts of the vessels hit by shells according to their respective ratio are as follows : the parts higher than the upper deck, had the largest number, viz : 14 shells, *i.e.*, 51.85 per cent of the total number ; the middle and lower decks being the next, were struck by 7 shells, *i.e.*, 25.93, and the smallest number of injuries from shells was sustained by the upper deck viz : 6 shells, *i.e.*, 22.22, while the part below the water line was struck by no shell at all.

TABLE NO. XV.—PARTS OF EACH VESSEL WHERE CASUALTY OCCURRED.

		Matsushima.	Yoshino.	Akitsushima	Tsukushi.	Fuso.	Katsuragi.	Tenryu.	No. 9 Topedro-boat.	Grand Total.
Upper deck.	Fore part	...	...	...	2	5	8	...	...	15
	Midship	...	7	...	5	...	...	7	...	19
	After part	...	...	1	...	...	...	...	...	1
Lower deck	Midship	...	...	...	1	.	...	1	...	2
Above the Upper deck.	The fore-castle ...	...	...	...	...	2	...	...	...	2
	The poop deck ...	...	...	1	...	...	...	...	...	1
	The bridge... ...	2	...	...	...	...	...	1	...	3
	The conning tower	1	...	..	...	...	...	...	..	1
Below the Wyter-line.	Cock-pit	...	...	...	...	...	...	1	...	1
	Engine-room ...	...	...	...	...	...	...	1	3	4
	Boiler room ..	...	...	...	..	...	...	...	5	5
	Total...	3	7	2	8	7	8	11	8	54

The killed and wounded of the landing party to the Luchotsai fortress and the crew of No. 22 torpedo-boat are not enumerated in this table, as they occurred on land.

The number of the killed and wounded at each place arranged in order of its rate, 35 cases (64.81 per cent.) occurred on the upper deck, 10 cases (18.52) below the water-line, 7 cases (12.96) above the upper deck, 2 cases (3.70) on the lower deck. If we compare these rates with the engagement of the Yellow sea, we find the rate of casualties agrees only with the cases of above the upper deck, but with the rest, the rates are almost reversed—that is to say, the lower deck that had the largest number in the Yellow sea has the smallest in this action, and that below the water-line which had the smallest on the occasion of the Yellow sea has comparatively a larger number in this, and the largest number in the killed and wounded in this action was on the upper deck.

TABLE NO. XVI.—CLASSIFICATION OF INJURIES ARRANGED ACCORDING TO LOCALITY.

Locality of Injury.	Killed and wounded.	Percentage of killed and wounded according to respective locality.
Various parts of the body ...	2	4.00
The head	15	30.00
The chest and back	3	6.00
The abdomen and loins	6	12.00
The upper limbs	8	16.00
The lower limbs	16	32.00
Total	50	100.00

The above table is the classification made according to the locality of respective injuries caused by shells, shell fragments and indirect shots such as iron or wooden splinters; besides these, there were a few others, that is, 1 case each of contused wound of the chest, and sprain of the right ankle joint, both caused by the shock of the explosion of a shell; 1 case of contused wound of the foot inflicted by the recoil of a gun wheel; 8 cases of scalds in No. 9 torpedo-boat consequent on the explosion of the boiler by a hostile shell. Also 3 cases of drowning and 2 deaths of extreme cold in No. 22 boat, but these are not included in the above table, as they are not caused by projectiles and have no relation to the localities injured by projectiles.

In this action, the region with the largest number of casualties was the lower limbs, next the head, and last the upper limbs. If the injuries be allotted to four localities; the injuries to the whole body, being excepted,—viz: the head, the trunk, the upper and lower limbs, we shall see that the head occupies 31.25 per cent, the trunk 18.75, the upper limbs 16.67, the lower limbs 33.33. If the area of these localities be considered the head and face occupies 8.51 per cent, the trunk 28.91, the upper limbs 21.14, the lower limbs 41.41, so that the number of injuries is greatest in the head, those in the other parts being nearly in proportion to their respective area. Again, if the above figures be added to those of the killed and wounded in the battle of the Yellow sea, the head claims 86 persons, i.e., 34.82 per cent, the trunk 54, i.e., 21.86, the upper limbs 46, i.e., 18.62, the lower limbs 61, i.e., 24.70, from which we see that the figures for the head stand high. Further adding to these the number of the killed and wounded from the shock of the explosion of shell or of firings, we get 95 persons, i.e., 34.80 in the head, 58 persons, i.e., 21.25 in the trunk, 53 persons, i.e., 19.41 in the upper limbs, 67 persons, i.e., 24.54 in the lower limbs. Once more by adding to these 5 cases of burns and scalds according to locality, we get 95 persons, i.e., 34.17 in the head, 58 persons, i.e., 20.86 in the trunk, 55 persons, i.e., 19.78 in the upper limbs, 70 persons, i.e., 25.18 in the lower limbs. But the statistical number of the killed and wounded in the battle of the Yellow sea as stated in table No. 7 A., and of those at Wei-hai-wei in the above table, comprises only one principal injury sustained by an individual in exclusion of all the other minor wounds. For instance, cases in which a more serious wound on the head were classified as such, to the exclusion of many less severe ones on the lower limbs, it is not clearly shown which locality really sustained the largest number of injuries and which the smallest. To obviate this, the following table was framed by counting each injury as an independent one, whether slight or grave; according to its locality.

TABLE NO. XVII.

Locality of injury.	Battle of the Yellow sea.		Action of Wei-hai-wei.	
	Injuries received.	Percentage of inj. according to respective locality.	Injuries received.	Percentage of inj. according to respective locality.
The head	110	27.92	29	29.59
The trunk... ...	65	16.50	10	10.20
The upper limbs	109	27.66	20	20.41
The lower limbs	110	27.92	39	39.80
Total	394	100.00	98	100.00

In the reports of the wounded, such statements as 'many or numberless' wounds were found, so that the real number of injuries can not be ascertained. Such are counted as a single wound collectively, to avoid possible error that may occur from arbitrarily assigning a number.

The percentage of the injuries both in the battles of the Yellow sea and at Wei-hai-wei as shown in this table, presents following rates:—the head 28.25, the trunk 15.24, the upper limbs 26.22, the lower limbs 30.28. When the injuries of each locality are considered, in comparison with the relative area of the whole body, then the percentages are as follows: the head is 16.33 to 1 unit of area, the trunk 2.59, the upper limbs 6.10, and the lower limbs 3.60, so that a strikingly larger rate in the head is followed successively by the upper and lower limbs, and the trunk. Viewed in any way, in the late naval battle, the head suffered with especial severity. Whether this is attributable to the frequency of various projectiles falling from above or to some other circumstances, can not easily be accounted for, unless further evidence be brought forth.

TABLE NO. XVIII.—TERMINATION OF WOUNDS IN RESPECTIVE LOCALITIES.

		Killed outright.	Died in course of treatment.	Recovery.	Invalided.	Total.
Greater parts of the whole body	Actual number ...	7	3	1	...	11
	Percentage.........	63.64	27.27	9.09	...	100.00
Various parts of the body	Actual number ...	...	...	3	...	3
	Percentage.........	...	...	100.00	...	100.00
The head.........	Actual number ...	6	1	1	...	8
	Percentage.........	75.00	12.50	12.50	...	100.00
The face	Actual number ...	...	...	7	...	7
	Percentage.........	...	...	100.00	...	100.00
The neck.........	Actual number ...	...	...	...	...	...
	Percentage.........	...	...	...	...	...
The chest and back	Actual number ...	3	...	1	...	4
	Percentage.........	75.00	...	25.00	...	100.00
The abdomen and loins	Actual number ...	4	1	1	...	6
	Percentage.........	66.67	16.67	16.67	...	100.00
The upper limbs	Actual number ...	...	...	8	...	8
	Percentage.........	...	...	100.00	...	100.00
The lower limbs	Actual number ...	...	2	16	1	19
	Percentage.........	...	10.53	84.21	5.26	100.00
Total	Actual number ...	20	7	38	1	66
	Percentage.........	30.30	10.61	57.58	1.52	100.00

Of the terminations of the wounds in the respective regions shown in table No. 18, the highest rate of death is in the column of 'greater part of the body,' as was the case in the battle of the Yellow sea, for the number of the 'killed out right' and 'died in the course of treatment' added together shows90.91 per cent of the actual number, that is 11, of which all but 1 terminated in death. This was because 6 cases of scalds of the whole body, 2 cases of death by extreme cold and 3 cases of drowning are included in this column. Excepting this column, the rate of death for the rest may be arranged in order: the head 87.50 per cent, the abdomen and loins 83.34, the chest and back 75.00, the lower limbs 10.53, thus it will be seen the rates differ not much from those of the Yellow sea.

Of 20 cases killed outright the percentages of the respective locality are thus: injuries of the whole body 35 per cent, of the head

30 per cent, of the chest 15 per cent, and of the abdomen 20 per cent. Compared with the killed in the battle of the Yellow sea, the order of the rates is almost the same in both, except that no injury on the lower limbs resulted in death in this action. Moreover if we compute the rates of the killed in the battles both of the Yellow sea and Wei-hai-wei, the injuries of the whole body constitute 33.64 per cent, head injuries 26.36, neck injuries 1.82, chest injuries 10.00, abdominal injuries 20.00, lower limb injuries 8.18; and it will be noticed that the rates show very differently from those of the injuries to the respective regions in the land battles before stated. This is because the characters of the wounds are different in the two kinds of battle.

(Refer to table No. 8 about the battle of the Yellow sea).

The deaths during treatment were 7, of which the percentages of injuries in the respective localities were as follows:—The injuries of the whole body 42.85, head injuries 14.29, abdominal and lumbar injuries 14.29, injuries of lower limb 28.57. However, 6 out of these 7 having expired on the day of injury before they had time to be properly treated, might well be counted as instant deaths. That is, two died from violent shock consequent on scalds of the whole body, one was frozen to death by falling into the sea, one died from the crushing of his skull by a large lacerated wound of the frontal region, caused by a shell-fragment, one died from a wound of the pelvic organ, the ilium having been crushed by a large perforated wound, one died from shock owing to the multilation of both thighs, one died from shock owing to the multilation of both legs and compound fracture of the face, lastly, one expired within 24 hours after receiving a severe scald on the whole body. Therefore though 7 cases are mentioned of the column of 'died in the course of treatment,' yet it must be remembered that they all died before they could duly be treated.

TABLE NO. XIX.—CLASSIFICATION OF MORTAL WOUNDS.

NAME OF WOUND.	KILLED OUT RIGHT.	DIED DURING TREATMENT.		TOTAL.
		DIED BEFORE ADMISSION.	DIED AFTER ADMISSION.	
Mutilation of the head	2	...	...	2
Destruction of the skull	1	...	...	1
Compound fracture of the skull	2	1	...	3
Penetrating wound of the skull	1	...	...	1
Perforated wound of the chest	1	...	...	1
Perforated wound of the chest with fracture of vertebræ ...	1	...	...	1
Mutilation of the chest and abdomen	1	...	...	1
Perforated wound of the abdomen	1	...	...	1
Mutilation of the abdomen	3	...	...	3
Compound fracture of the lumbar region	...	1	...	1
Mutilation of both thighs	...	1	...	1
Mutilation of both legs	...	1	...	1
Scalds of the whole body	4	2	...	6
Death by extreme cold	...	1	...	1
Drowning	3	...	...	3
Total	20	7	...	27

As is shown in table 18, thirty eight cases of which were cured one was invalided after the amputation of the left foot by Lisfranc's method.

The percentages of instant death, death within 24 hours of injury, death after 24 hours of injury but before admission, death after admission into the hospital, recovered and invalided, in the battles of the Yellow sea and of Wei-hai-wei are as follows.

TABLE NO. XX.

Results of the Wounds.	Actual number.	Percentage.
Instant death	110	30.22
Death within 24 hours of injury	21	5.77
Death after 24 hours of injury but before admission	10	2.75
Death after admission into hospital ...	9	2.47
Recovered	185	50.82
Invalided	29	7.97
Total	364	100.00

Comparing the above table with 20.00 per cent of 'Instant death,' 12.33 of 'Death during treatment in hospital,' 46.75 of 'Recovered,' 20.92 of 'Invalided' as computed by Longmore, we find that in this war, 'Instant death' has higher rate while 'Death during treatment in hospital' has lower one, and 'Recovered' has larger rate while 'Invalided' has a smaller ratio.

TABLE NO. XXI.—RESULTS OF TREATMENT OF THE WOUNDS BOTH IN THE BATTLES OF THE YELLOW SEA AND WEI-HAI-WEI.

INJURY.	Treated on board.	Treated in hospital.	Total.	Recovered.	Invalided.	Died.	Days of treatment.	Average days of treatment per case.
Injuries of the head	12	10	22	17	1	4	756	34.36
Injuries of the scalp...	9	6	15	15	...	...	356	23.73
Injuries of the skull	...	3	3	2	1	...	342	114.00
Injuries of the brain...	3	1	4	...	...	4	58	14.50

INJURY.	Treated on board.	Treated in hospital.	Total.	Recovered.	Invalided.	Died.	Days of treatment.	Average days of treatment per case.
Injuries of the face	29	9	38	33	5	...	2,041	53.71
Injuries of the soft part of the face.	19	2	21	21	...	...	245	11.67
Injuries of the facial bones	1	3	4	2	2	...	596	149.00
Injuries of the organs of sight ..	1	4	5	2	3	...	944	188.80
Injuries of the organs of hearing ...	8	...	8	8	..	...	256	32.00
Injuries of the neck	3	1	4	3	..	1	165	41.25
Injuries of the soft part of the neck.	2	1	3	3	...	...	163	54.33
Injuries of important structures of the neck	1	...	1	...	...	1	2	2.00
Injuries of the chest and back ..	9	6	15	14	...	1	653	43.53
Injuries of the thoracic wall & back.	8	5	13	13	...	...	582	44.77
Injuries of the thoracic cavity ...	1	1	2	1	...	1	71	35.10
Injuries of the abdomen & loins ...	4	6	10	6	...	4	505	50.50
Injuries of the abdominal wall & loins	3	2	5	5	...	..	320	64.00
Injuries of the abdominal cavity ...	1	4	5	1	...	4	185	37.00
Injuries of the upper limbs	20	35	55	44	10	1	4,443	80.78
Injuries of the soft part of the shoulder	...	1	1	1	...	...	79	79.00
Injuries of the scapula	...	5	5	3	1	1	545	109.00
Injuries of the shoulder joint... ...	1	...	1	1	...	...	13	13.00
Injuries of the soft parts of upper arm	6	5	11	11	...	...	511	46.45
Injuries of the humerus	1	3	4	2	2	...	834	208.50
Injuries of the elbow joint	1	1	2	2	...	...	24	12.00
Injuries of the soft parts of the forearm	6	5	11	11	...	...	557	50.64
Injuries of the radius and ulna ...	...	3	3	1	2	...	681	227.00
Injuries of the soft parts of the hand	4	6	10	10	...	...	316	31.60
Injuries of the bones of the hand ...	1	6	7	2	5	...	883	126.14

Injuries of the lower limbs	24	32	56	14	7	5	4,271	76.27
Injuries of the buttocks	...	2	2	2	...	...	141	70.50
Injuries of the soft part of the thigh	6	5	11	10	1	...	1,040	94.55
Injuries of the femur	1	2	3	1	...	2	100	33 33
Injuries of the knee joint	1	4	5	3	2	...	644	128.80
Injuries of the soft part of the leg ..	7	5	12	11	1	...	749	62.42
Injuries of the bones of leg	3	4	7	4	...	3	255	36.43
Injuries of the ankle joint	1	4	5	4	1	...	518	103.60
Injuries of the soft parts of the foot	5	3	8	8	...	...	254	31.75
Injuries of the bones of foot	...	3	3	1	2	...	570	190.00
Burns	23	25	48	21	6	21	2,891	60.23
Burns over one-third of the whole body	18	4	22	...	1	21	911	41.41
Burns of various parts of the body	1	19	20	15	5	...	1,872	93.60
Burns of particular parts	4	2	6	6	...	...	108	18.00
Scalds	3	1	4	2	...	2	98	24.50
Scalds of a greater part of the body.	2	...	2	...	...	2	2	1.00
Scalds of various parts of the body.	...	1	1	1	...	...	90	90.00
Scalds of particular parts	1	...	1	1	...	...	6	6.00
Frost-bite	1	1	2	1	...	1	57	28.50
Frost-bite	1	1	2	1	...	1	57	28.50
Total...	128	126	254	185	29	40	15,880	62.52

As shown in this table, the time occupied in the treatment of serious cases as injuries to the brain, the neck, cavities of the chest and abdomen, the femur, tibia and fibula as well as extensive burns and scalds was short, as most of them died soon after injury, on the other hand, comparatively long periods required for the treatment of extensive burns (more than one third of the whole body); and this is attributable to the fact that one case alone took more than 850 days. More will be said on this matter in Chapter VI.

CHAPTER IV.

CAUSES OF WOUNDS AND THEIR CLASSIFICATION.

In naval battles, the main cause of wounds is certainly shells, but their effects differ greatly according to the manner in which they either do, or do not "explode," or "burst." Besides, the shells themselves, iron and wooden splinters of other things caused by the bursting of shells, act as so called indirect shells. Therefore, materials that may become the causes of wounds are numerous. Table No. 1 shows the classification of different causes of wounds in each ship engaged in the various battles.

Besides the cases counted on table No. 1, there were five more deaths due to either drowning, or extreme cold, but causes which produced the injuries will, with these five exceptions, be recapitulated below from the largest number downward.

Fragments of the shells	149 cases.
Explosion of gun powder	49 cases.
Wooden splinters	36 cases.
Indirect shots	35 cases.
Fragments of iron	34 cases.
Shock of firing and vibration of gas... ...	16 cases.
Entire shell or shot	12 cases.
Shock of explosion of shell	12 cases.
Steam gushing out of boiler broken by a hostile shot	8 cases.
Fragments either of shells or iron	3 cases.
Chipped pieces of hardened paint	3 cases.
Bullets	2 cases.

Fragments either of iron or wood	2 cases.
Compression between two objects	1 case.
Fall	1 case.
Collision	1 case.
Husks of buck-wheat...	1 case.
Sum total	366 cases.

The above enumeration is reckoned by counting one chief wound out of the many smaller ones that each person generally received, for we find that the majority had several wounds from different causes. Therefore, in order to ascertain the relation between each cause, and the variety of wounds, as well as their number, we have to make a classification, by treating each wound as an independent one, table No. 2 is the classification of causes and wounds, based on the number of wounds but not on that of persons.

From table No. 2, we see that the total number of various wounds was 629, that by far the larger part of them was caused by the fragments of shells ; for the wounds of this class amount to 45.95 per cent of the total ; the second cause was ignition of gun-powder produced by the explosion of shells, of which the rate of wounds is 12.56 per cent; the third was the metallic indirect shots caused by the explosion of shells, of which the rate of wounds is 9.54 per cent; the fourth was the explosion of shells in which the gas and flame from the explosive, and iron or wooden splinters as well as the shell fragments were the conjoint cause, of which the rate of wounds is 9.38 per cent; the fifth was pieces of wood smashed off by shells of which the rate of wounds is 9.22 per cent; the sixth was the shock of shell explosion by which men were either knocked down or blown away of which the rate of wounds is 3.02 per cent; the seventh was the shock of firing and vibration of gas of which the rate of wounds is 2.23 per

TABLE NO. I.

Vessels. / Causative objects.	Matsushima.	Itsukushima.	Hashidate.	Fuso.	Hiyei.	Yoshino.	Naniwa.	Takachiho.	Akitsushima.	Akagi.	Saikyo-Maru.	Katsuragi.	Tenryu.	Tsukushi.	Torpedo-boats.	Landing-party.	Total.
Shells	6	...	...	...	1	...	...	...	...	2	...	...	...	3	...	...	12
Bullets...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	2
Fragments of shell	19	25	9	9	23	8	...	2	15	23	4	2	5	...	...	5	149
,, ,, metal	7	...	...	10	1	6	...	...	...	1	...	...	4	4	...	1	34
Wooden splinters	5	...	...	...	16	1	...	...	1	...	7	4	2	...	...	...	36
Explosion of shell	28	...	...	...	7	...	...	...	...	...	...	...	...	...	...	...	35
Shock of explosion of shell ...	5	1	...	...	4	...	...	...	...	...	...	1	...	...	...	1	12
Explosion of ammunition... ...	45	...	...	...	2	2	...	...	...	...	...	...	...	...	...	...	49
Fragments either of shell or iron.	1	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	3
Fragments either of iron or wood.	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	2
Chipped pieces of hardened paint.	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...	...	3
Husk of buck wheat	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1
Shock by firing or gas of gun powder	...	5	1	...	...	4	5	...	1	...	...	...	...	...	...	...	16
Compression between two objects...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	2
Fall	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1
Collision	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1
Steam	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8	...	8
Total	116	31	13	21	56	22	5	3	17	28	11	8	11	8	8	8	366

TABLE NO. II.

Causes. / Wounds.	Contusion.	Abrasion.	Grooved wound.	Wounds with loss of tissues.	Contused wound.	Blind wound and Penetrating wound.	Perforated wound.	Lacerated wound.	Mutilated wound.	Burns.	Scalds.	Perforation of Membrane tympani.	Total.
Shells	...	...	...	1	...	...	1	10	...	...	...	...	12
Bullets	...	...	...	...	...	1	1	...	...	...	...	...	2
Fragments of shell	19	47	6	3	97	57	33	27	...	...	...	...	289
Metallic fragments	5	10	...	...	25	12	3	5	...	...	...	...	60
Wooden splinters	17	13	...	...	23	5	...	...	...	...	...	...	58
Explosion of shell...	1	...	...	...	20	...	...	8	30	...	...	...	59
Shock caused by the explosion of shell	14	...	...	...	5	...	...	...	...	...	...	...	19
Ignition of gun powder	...	...	...	...	...	...	...	...	...	75	...	4	79
Fragments either of shell or iron	...	1	...	...	...	3	...	2	...	...	...	...	6
Fragments either of iron or wood	...	1	...	...	12	...	...	...	...	...	...	...	13
Chipped pieces of hardened paint	...	3	...	...	...	...	...	...	...	...	...	...	3
Husk of buck wheat	...	...	...	...	...	1	...	...	...	...	...	...	1
Gas produced by firing	...	...	...	...	...	...	...	...	...	3	...	11	14
Compression between two objects	1	...	...	...	1	...	...	1	...	...	...	...	3
Fall	2	...	...	...	...	...	...	...	...	...	...	...	2
Collision	...	...	...	...	1	...	...	...	...	...	...	...	1
Steam	...	...	...	...	...	...	...	...	...	...	8	...	8
Total	59	75	6	4	184	79	38	53	30	78	8	15	629

cent; the eighth was the fragments either of iron or wood, of which the rate of wounds is 2.07 per cent; the ninth is the entire shell (not exploded), of which the rate of wounds is 1.91 per cent; the tenth was steam and boiling water, of which the rate of wounds is 1.27 per cent; the eleventh was fragments of either iron or shell, of which the rate of wounds is 0.95 per cent; the twelfth was the compression between two objects and chipped pieces of hardened paint, of which the rate of wounds is 0.48 per cent each ; the thirteenth was by bullets and other similar, shots and falls, of which the rate of wounds is 0.32 per cent each ; the last and smallest was by collision and the husks of buckwheat, of which the rate of wounds is 0.16 per cent each. Besides these, there were 4 persons either drowned or frozen to death and 1 person frostbitten.

The wounds arranged in order of their number are contused wounds, blind wounds and penetrating wounds, burns, abrasions, contused wounds, lacerated wounds, perforated wounds, mutilated wounds, rupture of tympanic membrane, scalds, grooved wounds, lastly wounds of soft parts with loss of substance. The following is the description of the relations between the causative objects and the wounds.

1.—CONTUSION.

(1) Nineteen cases of contusion were caused by shell fragments, but the persons actually injured were only 14 in number, as some of them received two or three contusions at a time. They were all slight cases of ecchymosis or small hæmatoma. A few cases of some interest will be given below :—

1st example.—Case of contusion of the chest attended by simple fracture of the cartilage of the left 3rd rib. This healed in due time with no signs of injury to the internal organs nor any other bad sequence. (See clinical history No. 225.)

2nd example.—Case of contusion of the upper part of the right arm, where the skin was abrased, with ecchymotic swelling extending to the shoulder joint with the interference of its movement requiring more than three months before recovery. (No. 197.)

3rd example.—In this instance, the injured person was struck on the right inguinal region by a shell fragment.

As he had, however, a leather tobacco pouch and a pipe of German silver in the pocket of his coat, the fragment tore the pouch as well as the coat, and bent the pipe into a shape like this —“ ‹ —,” and stopped there. So happily there occurred nothing more than a contusion with subcutaneous extravasation of blood. Had it not been for the pipe, there would certainly have occurred a serious penetrating or perforated wound of the abdomen. '(No. 135.)

4th example.—Case of contusion on the 3rd and 4th ribs in front of the chest, which caused extravasation of blood as large as the palm of the hand attended with marked swelling; and then with spitting of blood, cough, sharp pain on deep inspiration. Crepitations also were heard in the neighbourhood yet no symptoms of injury to the ribs or cartilages could be seen. When he was admitted to the hospital on the 10th day after his injury, the spitting of blood had already ceased and no abnormal conditions of the heart, lungs, and pleura were detected. He recovered before long. Probably there had been some contusion of the lung though the ribs were not hurt. (No. 257.)

Fighting with such weapons as are made use of at the present day, we can readily see that materials driven about in a warship such as shell fragments are surprisingly numerous. For instance, the fragments that were found lying about in the Hiyei only, were abundant enough to fill a large chest. At first sight, it might naturally be expected that so large a number of fragments flying in a vessel would cause a great many cases of contusion as the surface of these fragments is often blunt and their velocity is generally somewhat impaired before they strike. Yet the fact is quite the contrary. The total number of various wounds produced by shell fragments was 289 as is shown in table No. 2, of which contusions numbered not more than 19, giving

6.57 per cent of the total. This comparatively small number of contusions is due to the fact that in naval engagements, fragments coming in from the shells that exploded at a distance are very few, the shells mostly exploding after they have struck the vessel ; and further, that the fragments generally injure persons at or about where the shells burst or exploded, for the fragments are prevented from flying about by strong walls and other obstacles abundant in vessels. Though these fragments may not be so powerful, yet are strong enough to inflict other kinds of wounds than mere contusions. Thus cases are very rare in which the fragments already weakened by colliding against various objects hit human bodies so as to produce only contusions. Moreover, fragments are of irregular shape having acute points and sharp edges, so that when they strike human bodies, they are apt to break the skin and inflict more than mere contusions.

(2) The number of contusions produced by the blows of metallic fragments were five, one to each person wounded : 3 being struck by broken pieces of gun-shield, 1 by some other iron-fragments and 1 by the broken piece of a brass rail. Each was a simple case merely attended by extravasation of blood, and none presented any feature worthy of special record.

It is a matter of course in naval battles that iron or other metallic fragments broken by hostile shells are driven about in all directions ; yet it is likewise certain that *ceteris paribus* these fragments are far weaker in force than the fragments of the shells themselves—especially so in the case of an exploded shell. For when a shell strikes metallic substance, the former first loses more or less of its original force according to the degree of resistance offered, and further, it imparts part of the already weakened force to metallic fragments which thus obtain their motion, therefore the metallic indirect shots which, whatever be their size, have a much smaller velocity, should produce more cases of contusion. But, in point of fact, there occurred only 5 cases of such injury, giving only a ratio of 8.33 per cent of the total number of 60 cases of various wounds attributable to the same cause. This compared with the ratio of cases produced by shell fragments is only a trifle larger. However, this was not a mere matter of chance. It is true that the detached pieces of metallic materials were much weaker in force than shell-fragments, but they scarcely ever flew to any great distance and mostly injured persons at comparatively short distances, so that they could inflict wounds other than contusions ; the more so, as they had the same irregular points and edges as the shell-fragments.

(3) The number of contusions owing to blows from wooden splinters was 17 for 14 persons. In most of these cases, there occurred no more sequences than extravasation of blood and swelling, and mostly recovered in a few days. A few cases of some interest are given here :—

1st example.—Case of contusion on the right forearm and hand by broken wooden pieces. When the patient was admitted to the hospital after four days of injury, the forearm was found swollen, and a fracture of the ulna was recognised at the juncture of the middle and lower third. A contusion on the back of the ring and little fingers on the same side with fracture of the first phalanx of the ring finger was also detected. The forearm and hand were fixed by plaster of Paris bandages, and in a month the fractures were united, but the movements of both fingers were impaired for ever and the man was invalided. (No. 223.)

2nd example.—Case in which the forearm and hand, and the outer side of the leg on the right side were struck by wooden splinters. There resulted extravasations of blood and swelling in the parts struck and a fracture of the head of fibula. A splint was applied to the leg and the case healed in a month. (No. 284.)

3rd example.—Case in which the right upper eye-lid was abrased, attended with contusion of the ball; the conjunctiva was congested and there was an extravasation of blood into the anterior chamber, so that the sight was much impaired. The extravasation in the anterior chamber was absorbed and the congestion of the conjunctiva disappeared in a few days, yet when the injured man gazed at any object; a mist seemed to float before the eye, so as to obscure the sight, and finally sight external strabismus resulted. (No. 108.)

Wooden splinters often served as indirect shots as well as iron fragments. Compared with iron fragments, the wooden splinters are much lighter accordingly the latter should *ceteris paribus* be much weaker in force than the former. It is true that a shell breaks wooden material more easily than iron and thus its force being far less reduced when it strikes wood, it seems probable that somewhat greater motion will be given to the wooden splinters, but as a rule they are much weaker in force than iron pieces, for there is a great difference in weight. Wooden splinters therefore will naturally produce more cases of contusion than the fragments of iron or shell and of the total 58 various cases injured by wooden pieces, 17 were wounds of this class, giving a ratio of 29.31 per cent of the total, which is, as it should be, far larger than that either of shell fragments or of iron-pieces.

(4) Fourteen cases of contusion caused by the shock of shell explosion occurred for ten persons.

1st example.—In the Matsushima, much ammunition exploded in consequence of the explosion of a hostile shell, and the shock threw the man backward, thus causing injuries on the back part of the parietal region, the right shoulder, and the right elbow joint. He fell into unconsciousness at the time, but coming to himself after a while, was engaged in putting out the fire. But the contusion at the elbow joint proved rather serious, being followed by a marked swelling, and needed hospital treatment. (No. 211.)

2nd example.—The same shock blew a man into the air, causing a sprain of the ankle joints and concussion of the spine. The ankle joints and the dorsa of the feet were greatly swollen and discoloured, followed by the paraplegia of the lower limbs, and tenderness at the lower lumbar vertebræ. The patient left the hospital much relieved after a treatment of three months. (No. 160.)

3rd example.—A case of sprain of the ankle-joints as well as of the tarsal joints from the same cause. The patient could not regain the power of walking after nine months' treatment in the hospital, and thus he was placed on the invalided list for life. (No. 293.)

4th example.—By a violent vibration caused by the explosion of a hostile shell on the Hiyei, a man was knocked down and sustained a sprain of his right ankle attended by the fracture of the outer malleolus and a partial dislocation of the joint. He was treated in the hospital for three months and left almost recovered. (No. 296.)

5th example.—At the same moment, a man was thrown down from the bridge against the rail and received a contusion on the right clavicle attended by a fracture of the bone. He recovered in a month. (No. 188.)

6th example.—At the Luchotsai fort, a hostile shell exploded at a distance of two meters, and by the force of the explosion gas, a man was thrown down from the citadel and had his ankle joint sprained. He recovered after a month of hospital treatment.

Besides these, there were cases of contusion on the right shoulder and the right side of the chest and of sprains of the tarsal-joints, but they are not worthy of being specially recorded here.

The shock produced by the explosion of a shell is extremely violent. For instance, when a 30.5 c. m. shell exploded on the fore part of the lower deck of the Matsushima and set large amounts of gun-powder on fire, not only was the upper deck terribly shaken but it was bent like an arch and rent wide open. Again when a 30.5 c. m. shell exploded in the wardroom on the lower deck of the Hiyei, the corresponding portion on the upper deck was raised four or five inches, and the mark was clearly to be seen afterwards on the stanchion. The shock being so sudden and violent, the persons present are generally thrown down, or precipitated, and thus are liable to contusion by strikng against other things. Fourteen cases out of ninteen injured in this way were contusions, showing a ratio of 73.68 per cent of the total. In this class of wounds there occur not unfrequenlty cases, such as severe sprains of the ankle joint, or the concussion of spine which delay recovery for many weeks.

(5) The cases of contusion owing to compression and falling are three: one is an instance in which a man was thrown down into the engine room by the shock caused by the discharge of the gun, and fainted from a blow on the chest; but almost immediately came to himself without any signs of fracture or injury to internal organs; one is an instance in which a man had his left foot squeezed by the recoil of a gun wheel which caused extravasation of blood on the dorsum of the foot, and the third was a case in which a man while carrying a torpedo slipped down on the deck on his right hand so hard that the first phalanx of his right thumb was fractured.

(6) A case occurred of contusion of doubtful origin on board the Akagi. While he was firing on the starboard side of the bridge in the battle of the Yellow sea, a 15 c. m. shell came from the stern, and passed about a foot in front of his eyes and burst against the gun support. The shell fragments inflicted several abrasions and contusions on the outer part of the left clavicle and of the lower limbs. From this time, his eye sight was lost, but no marks of contusions etc. were to be seen either on the eye-lids, nose, or face, though there was a congestion of the ocular conjunctiva without any sign of the intrusion of foreign bodies into the eye ball. When he was admitted to the hospital, four days ofter the accident, the conjunctivæ of both eyes were inflamed, the cornea of the right eye was cloudy so that he could not tell light from dark, and acute pain was felt in both eyes. When the eyes were examined a few days afterwards, conjunctivitis of the right eye persisted with ciliary congestion, the cornea was somewhat turbid,

the iris exhibited a serrated appearance at its upper edge producing posterior synechiæ, the lens was partly dislocated towards the nasal side, and presented a grayish opacity, the eye-sight was entirely lost. As to the left eye, there was apparently no change, yet on examination of the fundus, detachment of the retina with hæmorrhage was found ; also entire loss of sight. After many months of treatment in the hospital, the wounds in the various parts of the body were already healed, and the inflammatory symptoms of the eye had disappeared, but the sight was lost forever. He was therefore invalided for life (No. 107.)

How this contusion of the eye-balls was occasioned is inexplicable considering that the broken pieces of the shell had passed one foot in front of the face ; and again taking it for granted that the eye-balls were hit by some of the pieces, it is equally strange that the eye-lids and the bridge of the nose were left uninjured ; for it is quite inconceivable that when both eyes were contused by broken pieces of a shell, the bridge of the nose lying between them should escape without sustaining even a slight contusion. The riddle could be solved if we could assign the cause to explosion gas, from which the skin of the face might have sustained no injury whilst the sensitive and delicate eye-balls did. But the fact that the shell did not explode but was simply broken, is so certain on investigation that no doubt can be entertained on that point. Then, could the theory of " a wound from the wind of a ball " which prevailed in former days be trusted, the present case could easily be explained. According to that theory, the shell forces its way through the air, so rapidly that it produces either a violent centrifugal vibration around the shell or centripetal vibration of the air just behind it, as the air around rushes in to fill the vacuum. If a man be struck by this violent vibration of the air, the skin may escape from injury, yet internal organs will be hurt by compression.

However, the absurdity of the wind-ball theory has been made so plain by facts and experiments, that there is scarcely left ground for harbouring any belief in it, and so the present case can not be considered as an instance of the so called wind-ball wounds. Besides, during the late war there were many instances in which no injury was sustained in spite of the close passage of shells. In default however of a clearly-ascertained evident cause for this case, we can venture on a supposition by taking into consideration the circumstances at the time of injury. Several persons who were engaged in firing the same q. f. gun were all seriously wounded at the same moment. One had both his thighs nearly severed, and was thrown down into the hammock netting by the shock, and died instantaneously. The second man was also killed on the spot having the pelvis and right thigh multilated. The third man sustained a perforated wound on the left shoulder and a penetrating wound on the neck. The last, two men and the person now in question were found stretched on the deck and groaning. From these considerations we infer that the injured man in question may reasonably have received contusion of the eye-balls by colliding heavily with one of the other wounded persons, or by being struck on the face by a limb or the body of another. It is true that this theory can not be supported by evidence as the injured man did not remember the conditions at the time of injury; but seeing that there was left no trace of lesion on the face, we can not but infer that the eyes were heavily compressed or hit by something soft.

Besides the above, among those killed instantaneously on board the Hiyei and Matsushima, there were cases of serious contusion in which though the skin remained intact, yet the soft tissues beneath were extensively reduced to a pulpy mass and the bone pulverized, so that when the part was touched it gave the sensation of touching an ice-bag. Such cases were noticed by the surgeons concerned, but they were so busily engaged in the treatment of the wounded that they could not afford to do more than merely record the wounds deemed to be the chief cause of death. These wounds however were mostly on the thighs, and were probably caused by blows from the obtuse surface of large shell-fragments or of pieces of iron or wood. These wounds are not unfrequently met with in naval warfare, and it must have been a matter of mere chance, that no instance of this kind occurred among the wounded persons who remained alive at the end of the action.

As we have above mentioned, there are 59 cases of contusion, of which 19 were caused by the shell-fragments ; 5 by metal fragments; 17 by wooden splinters ; 14 by blows sustained from being knocked down by the shock of shell-explosion ; 3 by compression or fall owing to the shock of firing guns, and 1 the cause of which has not been ascertained.

In naval battles, it is natural that a great many injuries should be occasioned by the above enumerated causes. Notwithstanding this fact, 59 cases of this class show a ratio of only 9.38 per cent out of 629 cases of all injuries ;—a ratio much less than might have been expected. But this is probably owing to the fact that serious contusions accompanying other fatal wounds were not recorded, and also that cases of slight contusions escaped notice as they were not reported for treatment.

2.—ABRASED WOUNDS, GUTTER WOUNDS, WOUNDS ATTENDED WITH LOSS OF SOFT TISSUES.

Abrased wound is the general term including all that class of injuries in which the direction of the shell-fragments is almost parallel with the surface struck, so that only the epidermis or a piece of the skin is stripped off.

Those wounds which expose the subcutaneous or muscular tissues, yet do not resemble the gutter wound, are also enumerated in this category. "Gutter wound" is the appellation for those wounds produced by the same cause as above, in which the tissues were lost in a long, narrow shape forming a groove. "Wound with loss of soft tissues" is the general name for wounds in which both the skin and other soft tissues have been extensively lost from the same causes.

(1) The abrased wounds due to the fragments of shells numbered 47 in all, occurring in 30 persons. None of them presented interesting phases worthy of special record, as they were all healed in a few days; and with those wounds which were rather deep there were none with a surface clean cut as by a sharp blade, but, mostly, the tissues of the surface were irregularly contused with more or less extravasation of blood around them. Of the 289 cases of all kinds of wounds caused in this way, this class shows a ratio of 16.26 per cent.

(2) Abrased wounds produced by iron-fragments were 10 for 9 persons, all of which were a light nature and need no special record; the ratio is 16.67 per cent of 60 wounds produced in this way. This is almost the same as the ratio of the wounds occasioned by shell-fragments.

(3) Abrased wounds inflicted by wooden splinters numbered 13 occurring in 8 persons and were all light. They bear a ratio of 22.41 per cent out of 58 wounds, the total produced by the same cause, and the ratio is comparatively a little larger than those of shell-fragments and iron-pieces. This is probably attributable to the fact

that the wooden splinter which is not so heavy is apt easily to deviate its course when it hits an object ; and can give no further injury than the present kind, even if it strikes the tender skin at an angle of which other missiles as shell-fragments or iron-pieces would have produced wounds other than mere contusions.

(4) Besides those mentioned above, there were two cases in which it could not be ascertained whether the injury was caused by a shell-fragment, iron-piece, or a wooden-splinter ; and three cases in which abrasion of the skin of the face was due to blows of flying pieces of paint.

Abrased wounds numbered 75 in all ; and this seems to be rather numerous compared with the number of contused wounds, considering that the glancing of missiles from surfaces almost parallel with their direction (which is the cause of the abrased wound) must be by far less frequent than their impact against surfaces lying at right angles to them which is the cause of contused wounds. But if the 85 cases which form the total of the injuries in question, and of gutter wounds and wounds with loss of tissues occurring from identical causes, be compared with the 413 cases, which form the total of the various wounds produced by missiles striking the skin at a right or obtuse angle, the ratio will be seen to be no larger than 1 to 5, which can not be said to be disproportionate. Moreover, as not a few shell-fragments and iron-pieces take a slanting direction in coming down, it may reasonably be expected that they will in many cases merely graze the skin. Again, in the time of battle, surgeons are often too busy fully to study the nature of each wound and abrased wounds may be hastily classed amongst contusions, and vice-versa. The records are necessarily brief and discrimination is often very difficult.

(5) The gutter wound :—6 cases in all occurred in 6 persons, each caused by a slanting blow from a shell-fragment.

1st example :—The injured man sustained a wound 3 c.m. long and 5 m.m. wide reaching the subcutaneous tissues, running inwards and downwards at the part above the left patella and attended with a contusion of the tissues around the margins of the wound. (No. 253.)

2nd example :—The injured man received a wound 6 c.m. in length, 4 c.m. in width, and 1.5 c.m. deep, on the back of the lower part of the left forearm. The margins of the wound were markedly contused, and the surface irregular. It was at last cured after treatment for 4 months. (No. 219.)

3rd example :—In this case the injured man received a wound 3 c.m. long, 1 c.m. wide, and 1 c.m. in depth in the left parietal region running to the right and towards the back ; the margins were torn and ragged, and an irregular shell-fragment the size of a pea was lodged in the wound. It was healed after treatment for 3 weeks. (No. 43.)

4th example.—The injured man sustained a wound 3 c.m. in length, 1.5 c.m. in width and reaching the subcutaneous tissues, on the ulnar side of the upper third of the right forearm. The margins were bruised. It was completely healed after treatment for 3 weeks. (No. 218.)

5th example :—The injured man received a wound running laterally at the supra spinous region of the right scapula. It was 8 c.m. in length and 3 c.m. in depth, and the margins were sharp ; sutures were tried, but the wound suppurated and took 70 days to heal. (No. 191.)

6th example :—The injured man received a wound in the anterior surface of the lower third of the right arm. It had a length of 4 c.m. and a width of 1.5 c.m. and was 1.2 c.m. in depth ; the margins were sharp, the bottom irregularly lacerated. The wound was healed after a month. (No. 203.)

Each of the above 6 cases of gutter wounds had an irregularly lacerated surface with bruises around it, and there was not a single case which looked as if a slice had been made by a keen blade as is often the case with bullet-wounds. Accordingly, though hæmorrhage was not copious the healing process was slow, and comparatively a long time was required for the treatment.

(6) Wounds with loss of tissues are 4, one caused by the slanting blow of a shell ; the other three by fragments of shell.

The wound caused by a shell was a large one, extending between the crest of the right ilium and the costal arch, and covering an area 15 c.m. in transverse and 9 c.m. in vertical diameter. The soft tissues were torn off in an oval shape leaving an irregular bruised margin. A few days after the injury, which was sustained on February 7th, the skin around the wound became sloughy and the wound suppurated. At the time of admission to the Sasebo Naval Hospital, the wound had increased in size, but under treatment, it gradually improved, the granulation looked healthy and the wound was progressing favourably, when on June 10th, the temperature suddenly rose to 38°.4 C. attended with chilliness, and the wound showed two yellow patches each about the size of a two *sen* copper and speckled with blackish spots The discoloured granulation was then examined under the microscope, and numerous streptococci were noticed. The discolored parts were painted with a 10 per cent solution of carbolic acid, followed by a wet carbolic compress saturated with 3 per cent solution. On the 11th, the temperature became normal, and the discoloration somewhat abated. The former treatment was continued, and by the 14th, the granulating surface was restored to healthy state, not a single coccus being visible. However, on the 19th, the same discoloration again set in, attended by pus discharge, rise of temperature and growth of streptococci. So the same treatment was repeated which restored the granulation to a healthy condition on the 24th. From that time the healing was rapid and on July 12th, 4 pieces of skin were grafted, and the wound was completely healed on August 23rd. (No. 159.)

The 1st case : The wound caused by shell-fragment was an injury which carried off the skin and muscular tissues over an area 18 c. m. long and 12 c. m. wide on the calf of the right leg. At the bottom of the wound, a deep muscular layer was exposed but the posterior tibial artery fortunately escaped injury. The hæmorrhage was slight, but in addition to the above wound, the man had sustained a perforated wound in the lower part of the left thigh. At the time of admission to the Sasebo Naval Hospital, the wound suppurated, the bruised tissues became sloughy, and the pain was intense. On the 28th of the same month, the mortified parts came entirely off, and the surface became clean. The subsequent course was favourable and it was perfectly healed on January 15th of the following year by cicatrization. The hip and the knee joints, however, ankylosed at an angle of about 150°, and the swelling and numbness of the foot remained. Local bathing, massage, and forced extension, were resorted to, and the numbness was gradually relieved ; but as his walking power was not sufficient for him to return to active service, he was discharged on April 19th. (No. 279.)

2nd case : In this case a wound of 10 c. m. square was inflicted on the inner side in the middle of the right thigh ; the whole layer of the skin was carried off, so that the areolar tissues were exposed ; the wound surface and its margins were irregularly torn and bruised. The wound suppurated afterwards. The case was also attended with a blind wound in the upper part of the same thigh. However, it made favorable progress, and was cured on October 28th. (No. 254.)

3rd case : In the present case, the skin and muscles at the middle of the outer side of the left leg were carried off over an area of about 6 c. m. square attended with a large perforated wound in the abdomen. The injured man died 7 hours after the injury. (No. 173.)

The four cases of wounds with loss of tissues above stated, naturally belong to the same category with the abrased and gutter wounds, yet on account of the extensive area of the injured parts owing to the large size of the projectiles, there was a great difference in severity compared with the other two. Especially with the case which was caused by an entire shell, the injury was naturally serious. It was produced by the compression of the skin against the rounded lateral surface of a shell, which, though it would not as a rule tear open tissues, yet owing to its weight and subsequent force, exerted a pressure strong enough to rend and crush the tissues. Thus the injury was not limited to the part torn, but the surrounding tissues were extensively contused. The healing process was accordingly slow, occupying a comparatively long time. The 2nd case was produced by a shell-fragment. Judging from the area and depth of the injury, it must surely have been a large fragment, though certainly not so large nor so heavy as the entire shell. Its force therefore, as compared with the force of the entire shell was probably weak, but as it was a fragment with probably an irregular shape and keen edges, it may have destroyed the tissues not only by pressure but also by laceration. Accordingly, in this instance the tissues around the wound suffered contusion indeed, but it was slight as compared with the 1st instance, and in spite of the size and depth of the wound, a much shorter time was required for recovery.

3.—CONTUSED WOUND.

(1) The contused wounds caused by shell-fragments numbered 97 in all occurring in 59 persons of which interesting cases are as follows :

a.—In this case the injured man was struck by a fragment of shell and received a contused lacerated wound on the outer side of the lower third of the left thigh. On the skin there were 3 lacerated holes, each of the size of one *sen* copper, the femur being broken at the same time ; besides, consequent on the explosion of gun powder, he sustained burns over a large part of the body. These injuries proved fatal to the patient on the day following. (No. 323.)

b.—In this case, the injured man had the 2nd phalanx of the left index finger crushed by a shell fragment ; the soft tissues were greatly damaged, and the bone was smashed. He sustained also burns over a larger part of the body. After admission to the hospital, the injured finger was cut off at the 1st phalangeal joint, and owing to the loss of the finger he was dismissed from service. (No. 241.)

c.—The injured man had the squamous portion of the left temporal bone broken by a shell-fragment, accompanied by burns of a greater part of the body. At the time of injury he was unconscious, and though he was brought to himself after a while, yet the intense pain gave him extreme agony to which he succumbed on the following day. Death was due to concussion of the brain but the chief cause of death was the extensive burns. (No. 324.)

d.—This was a case of a contused wound 5 c. m. square rent open in a star like shape, at 6 c.m. below the spinous process of the left scapula, together with small contused wounds on the outer side of the left little toe, and on the inner side of the right great toe. The contused wound on the scapula reached deep, so that the finger, if inserted, directly touched the bone, which was however found intact. The wound canal took an upward and outward course for 4 c.m. in depth. After a time, the wound fell to suppuration, and pus was accumulating at the lower part of the wound, where accordingly a counter opening was made to facilitate its evacuation. However, the healing process was unfavorable, and on October 12th, the temperature suddenly rose, and in spite of the slight discharge of pus, the margins of the wound became congested and signs of erysipelas appeared. The temperature reached 40°. C. and the local inflammation extended somewhat, but on the 26th the signs entirely disappeared and the wound was completely healed on November 14th. (No. 190.)

e.—This was a case of large contused wounds attended with fractures in the middle of the right upper arm, and of the lower part of the left thigh, and of the left leg; besides, there was a perforated wound of the abdomen. The injured man died on the spot. (No. 165.)

f.—This was a case in which a contused wound 3 c.m. long was sustained on the left parietal region. The margins of the wound were irregularly torn, and its depth reached the bone; the pericranium was detached and the outer plate broken, but happily no signs of compression or of injury to the brain substance were present. In the course of time, a free piece of bone at the bottom of the wound was removed, and from that time favourable progress was made until it was completely healed on December 10th. (No. 48.)

g.—This was a case of a contused wound on the inner side of the lower-third of the right thigh. There was copious bleeding owing to the injury of the femoral artery, so one of the carriers of the wounded man stopped the hæmorrhage by a compress bandage and carried him into the surgery in the wardroom at the rear of the lower deck. He was being attended by the surgeon, when unfortunately a hostile shell exploded in the room and mutilated his chest and abdomen so that he died instantly. (No. 154.)

h.—This was a case of a carrier of the wounded who brought the man above mentioned to the surgery when a fragment of shell gave him a severe contused wound tof he face with a fracture of the base of skull; he died on the spot. (No. 53.)

i.—This was a case of a small contused wound in the upper border of the right temporal region; it reached the bone but without any lesion to it. However, after a time paralysis of the left fingers supervened, which persisted after the healing of the wound in three weeks. (No. 41.)

k.—This was a case of a contused lacerated wound 6. c.m. long and 3 c.m. wide extending from the left side of the forehead to the vertex and causing fracture of the skull, and injury to the brain. In addition, he sustained another wound 24 c.m. long and 9 c.m. wide on the outer side of the left leg and many others of the same description on the face, chest, and the limbs. The injured man died instantaneously. (No. 51.)

l.—This was a case of a contused lacerated wound 15 c. m. long and 6 c.m. wide extending from the middle of the forehead to the vertex. The cranium was smashed and the brain injured; besides, he sustained a contused wound in the middle of the right upper arm and on the back of the elbow joint of the same side, attended by the fracture of the bone. The injured man was unconscious and died soon after the injury. (No. 49.)

m.—This was a small contused wound with loss of tissues below the left eye; the superior maxilla was broken to pieces, so that the wound communicated into the antrum, and the hæmorrhage was copious. The eye lids were much bruised and in the ocular conjunctiva 2 or 3 minute iron pieces were to be seen. On examining the antrum broken pieces of the bone and coagulated blood were found but no injuries to the other bony walls of the antrum. The wound fell to suppuration; the eye lids were greatly swollen, the swelling, however, subsided in course of time. On examination, the vision of the left eye was reduced to $\frac{20}{100}$, with retinal hæmorrhage. The left cheek and lips became anæsthetic. The wound was completely healed by December 18th; the eye-sight was not yet recovered, the anæsthesia of the left cheek and lips also still lingered. So the patient was dismissed from service on February 9th of the following year. Besides the wound mentioned above, the patient received a perforated wound in the upper part of the left arm, and two contused wounds in the upper part of the left forearm attended with fractures. (No. 103.)

n.—This was a case of a contused wound 6 c. m. long, on the left side of the forehead. The wound reached to the bone and detached the pericranium, but the bone was intact. The soft tissues around the wound were irregularly torn and swollen, and the skin below the eye of the same side presented a purplish discolouration.

A short time after the injury, epistaxis twice appeared. The patient's mind was clear at first, but afterwards signs of cerebral irritability appeared, and he would bend or toss about his body and limbs, and at times fall into stupor with occasional delirium and incontinence of urine. After a couple of days, the wound suppurated and the cerebral symptoms persisted, the patient was unconscious ; his pupils were contracted, with sluggish reaction to the light. The temperature fluctuated somewhere about 38° C.; afterwards the pus burrowed beneath the occipito-frontalis, so a counter opening was made. Ten days after this, his mind became somewhat clearer though he still suffered from headache, and in 3 weeks after the injury, the brain symptoms had entirely gone, and 4 months after, he returned to duty. This was probably a case of fracture of the base of cranium. (No. 52.)

O.—This was a case of several wounds caused by many fragments of a shell :—A contused wound 6 c. m. long and 1 c. m. wide and as deep as the pericranium in the vertex ; a contused wound 3 c.m. in length and 1 c.m. in width, running laterally along the right side of the upper lip ; a contused wound 12 c. m. long and 7 c. m. wide, stretching from the inner side to the posterior surface of the left thigh ; a contused wound which destroyed all the digits of the 1st, 2nd and 3rd toes of the left foot After a few days, the fore part of the injured foot became gangrenous and Lisfranc's disarticulation was performed, and in 5 months all the wounds were healed, yet on account of the loss of a part of the foot, he was discharged from service. (No. 304.)

Other contused wounds besides those stated above, showed more or less difference in size, but most of them were only cases of contusion of the soft parts without any complications worthy of record ; and a few which were attended with fractures were no more than wounds as of fingers, which healed in due course of time and presented no interesting phases. They are, accordingly, omitted here.

Contused wounds caused by shell-fragments totalized 97 as has been mentioned; if this be compared to 289, the total number of various wounds from the same cause, it will bear a ratio of 33.56 per cent, a sum which stands highest among all kinds of the wounds produced by shell-fragments. However, as will be shown later, compared with iron-pieces or wooden splinters, shell-fragments bear comparatively a low ratio, in producing wounds of this kind. This is because shell-fragments having, as a rule, a stronger force than the others, are more prone to produce other kinds of wounds; that is, penetrating or perforated wounds with the smaller fragments, and mutilating wounds with the larger ones. The size and severity of contused wounds from shell-fragments do not only greatly differ according to the size and force of the fragments, but also according to the character of the surfaces with which they strike the skin, that is, whether they have a plain surface or an edged. For example, there are some cases in which the skin was opened, soft tissues smashed and a deep seated bone as the femur crushed to pieces (as with cases *a* & *e* ; and some cases in which though the injury was confined to the soft tissues, yet it was extensive in area as is remarkably seen in case *k*, which was perhaps caused by a large shell-fragment flying nearly parallel with the long axis of the injured limb; just in the same way as a small shell-fragment which produces a grooved wound. And there are cases in which the injury was so small and shallow that the skin and subcutaneous tissues only were rent. So we see striking differences in the severity of the contused wounds. However, in every case, the wound had an irregular surface, with severely contused margins so that the vital function of the tissues was lost. Again, of those cases in which a part lacking soft tissues was hit by a small shell fragment, the contusion was mostly very slight. In these cases, a portion of shell-fragment may, in spite of having penetrated into the tissues, fall out again, owing to the resistance of the hard bone. Accordingly, there may be some cases which should properly be enumerated among blind wounds, but the distinction is difficult as the fragment was not retained in the wound. The contusion of the head is naturally very serious; in cases *h* & *k*, the skull was extensively broken involving the brain substance, so that the men died on the spot. Case *n* was a case of contused wound 6 c.m. long, on the forehead; it reached the bone though no lesion was then recognized in it, but by subsequent symptoms it was plain that the orbital plate of the frontal bone and ethmoid were fractured. The case fortunately recovered. With bullet wounds, it is a matter of so rare occurrence, that an indirect fracture like the above is still a matter of doubt as to its possibility, while it is a matter of course with gun shot wounds. For, if a shell-fragment which is heavy but not high in velocity, strikes the head with its dull round surface, the skull may escape fracture owing to the wide area of the bony surface, but, the pressure diverging in every direction, the weakest part is liable to be broken. Case *c* was attended with a fracture in the temporal region but without any injury in the brain substance, nor any remarkable hæmorrhage within the cranium. Unconsciousness present at the beginning must have been the result of concussion, and the pain and struggling agony which occurred after the recovery of consciousness were the result of the burns received all over the body. It is a well recognized fact that sufferers from extensive burns show the same symptoms, sometimes accompanied by traumatic delirium. Case *f* was a case of contused wound 3 c.m. in length on the left parietal region breaking the outer plate of the parietal bone. It was uncertain whether the inner plate was broken or not, yet as far as examination proved, the bone lesion was only in the outer plate, as no brain symptom was present, and even, granting that the inner plate was injured, it was not broken to pieces as the outer plate. The inner plate as a rule is liable to be broken more widely than the outer, and accordingly it is not infrequently found that the former is injured when the latter is intact. The reverse is a matter scarcely recognized in military surgery, and its very possibility is still questioned. However, as far as the evidence of the present naval battles goes, there were not a few cases in which bones, besides the skull, were injured only on the superficial layer or the outer wall, so that when hit by keen edges of a weak shell-fragment, the bone like the skull sustained injury only on its outer plate. Case *i* was a small contused wound on the upper part of the right temporal region, in which though no bony lesion was recognized yet anæsthesia and paresis of the left index-finger appeared. Whether this was consequent upon the pressure of the centre of the finger, located behind the fissure of Rolando, by a small extravasation of blood arising from fissures made in the inner plate of the bone, or upon the injury of the brain by the piece of broken inner plate, or upon a small contusion on the superficial layer of the brain without any lesion to the bone or membrane, is not ascertained. For, it could not be known whether there were symptoms of cerebral irritability or compression at the time of injury, as all the surgeons on board the ship were killed, and the clinical records are so brief that no inference can now be drawn from them. But considered from the fact that the paralysis and anæsthesia were confined to the index finger, the injury within the skull must have been very slight.

(2) Contused wounds caused by iron-fragments totalized 25 cases occurring in 14 persons. They differed greatly in their severity, but all except those stated below, were healed in due course without any interruption, and presented no interesting features worthy of record.

1st instance :—This is a case of a contused wound 4 c.m. long and 2 c.m. wide, running forward from the right angle of the lower jaw along its lower border. It was caused by one of the scattered fragments of the funnel, the lower part of which was perforated by a hostile shell. The margins of the wound were extremely ragged and the outer plate of the jaw was broken to pieces, some of which were found free, but the inner plate was not involved, nor the facial artery injured. The wound fell to suppuration, but took a favorable course, and was healed in two months. (No. 104.)

2nd instance :—From the same cause as the above, the front part of the left knee joint was struck; the skin was widely torn, and the patella and lower end of the femur were crushed, hæmorrhage was not copious; the popliteal artery seemed to be intact. Besides this, the man sustained a blind wound in the back. The patient was clear and firm in mind without any sign of cerebral concussion. On the next day, the resection of the left knee joint was performed and he was on the 21st, admitted to the Sasebo Naval Hospital. At the time of admission the part below the knee joint was cold and numb, and the foot had already become gangrenous. Therefore the amputation at the lower part of the thigh was performed, and the wound was completely healed in January of the following year. (No. 270.)

3rd instance :—This was a contused wound 2 c.m. long on the outer side of the lower end of the left upper arm from an iron fragment. The wound reached the bone giving a little depression with superficial fissures in it. No foreign body was lodged within. After 3 or 4 days, the margins of the wound sloughed off and the wound was soon healed. (No. 206.)

4th instance :—A contused wound on the inner side of the upper part of the right leg. The margins of the wound were torn and gaping ; at the bottom the periosteum of the tibia was detached, and beneath it several fissures of some 2 c.m. long were produced. After a time, loose pieces of the bone were extracted from the wound of the leg, after which the wound made due progress and was healed in 2 months. (No. 286.)

5th instance :—The forehead was struck by a fragment of a gun-shield broken by a hostile shell, and the posterior half of the bone was smashed, the brain substance being at the same time destroyed. This case was accompanied with the mutilation of the left forearm. The injured man was killed on the spot. (No. 46.)

6th instance :—From the same cause as the above, the forehead was smashed resulting in instant death. (No. 50.)

7th instance :—A small contused wound, just above the internal condyle of the right humerus. The wound measured about 1.5 c.m. in depth ; the margins were peeled off the fascia for 3 c.m. in the form of a bag ; the bone and the ulnar nerve were found safe, but afterwards the parts supplied by the nerve, that is ; the palmar and ulnar sides of the right ring finger, the whole of the little finger, and the inner border of the palm were affected with loss of motion and sensation. The wound was healed in 5 weeks, but the numbness and paralysis of the fingers lingered 3 weeks more. This was probably due to the contusion of the ulnar nerve. (No. 200.)

Contused wounds caused by iron-pieces were 25 which, proportioned to the 60 cases of various wounds produced by the same cause, would bear a ratio of 41.67 per cent. This kind of wound therefore stands highest among the various wounds by iron-pieces. Compared with 33.56 per cent which is the ratio of contused wounds owing to shell-fragments, this wound seems to have a comparatively larger rate. This is perhaps due to the fact, that though many of the iron-pieces are big and heavy, and irregular in shape, yet the velocity is less than that of shell fragments and more fit to produce contused wounds or contusions. The contusion of the tissues around the wounds are the same with those caused by shell-fragments in character; for instance, in the 1st instance above mentioned, though the outer plate of the lower jaw was broken, yet the inner plate was sound. In the 3rd instance, a small shallow circumscribed depression was produced on the outer side of the lower end of the humerus. In the 4th instance, 2 or 3 fissures some 2 c.m. in length were produced on the inner side of the upper part of the right tibia. These limited shallow lesions of bones were perhaps due to the fact, that the bony surface was directly hit by an edge of an iron-fragment. Had a part abounding in soft tissues been hit, a blind wound would surely have been produced. The said iron-piece being small and weak in force could not perhaps inflict more than a slight injury to the bone. It can easily be seen that a missile like bullet which is so great in velocity and has so obtuse a surface, would often inflict injuries more severe than in the present case; but a projectile like an iron-piece which has sharp edges but a weak striking force, is more fit to produce a bone injury of this kind. The 2nd instance is the case of a great contused wound in the front part of the knee-joint, in which the patella and the lower end of the femur were smashed, and an amputation was performed. Hæmorrhage was slight at the time of the injury, and the popliteal artery was found safe, yet considered from the gangrene which set in soon after, there must probably have been an injury of that artery. With regard to this case, further remarks will be made later on. The 7th instance was the case of a contused wound just above the internal condyle of the right humerus. Though apparently there was no injury of the ulnar nerve, yet seeing that numbness and paralysis ensued in the regions distributed with the nerve, there must have been contusion of the nerve. The 5th and 6th instances are the cases of contused wounds of the head, in which the bone and brain were crushed, causing instant death. No wonder such fatal wounds should be inflicted by blows from large iron-pieces.

(3) Twenty three cases of contused wounds caused by wooden splinters occurred in 21 persons, most of them were slight ones, and the only cases of any interest are as follows :—

The 1st example was a small contused wound in the left parietal region caused by a wooden splinter. The scalp was torn, but the wound was shallow and did not pierce the occipito-frontalis, and there was no sign of bone lesion. However, after a while, paralysis in the right side of the face appeared, so that the eye-lids could not properly be closed, and the tongue inclined toward the right side, and the speech was also impaired, attended with a slight paralysis of the limbs of the same side. Though the wound of the head healed before long, it was 2 months before the paralysis was cured· (No. 38.)

The 2 example was the S shaped contused wound, 9 c. m. long, running obliquely upwards from the upper part of the left superciliary ridge of the forehead. It reached to the bone which was broken. Besides, on the right side of the face were burns, and the sight of the left eye was greatly impaired. But no symptoms of brain injury existed. On ophthalmoscopic examination, hæmorrhage of the retina was recognized. After 40 days the wounds healed, but the sight was not restored, and attended with diminution of the field vision. In spite of every means of treatment recovery of the sight was hopeless, and accordingly the patient was discharged from service for life. (No. 47.)

The 3rd example was a contused wound inflicted by a flying wooden splinter. The wound was 4.5 c. m. in length and 1 c. m. in width extending from the left frontal eminence to the upper eye-lid passing between the eye-brows, and penetrating to the bone. The margins were torn attended with slight hæmorrhage. Both the upper and lower eye-lids were greatly swollen with an extravasation of blood, and beneath the ocular conjunctiva and in the anterior chamber there was hæmorrhage. The cornea became opaque, and the sight was entirely lost. The wounds gradually healed, but the swelling of the eye-lids still remained so that the eye could not be opened. The ocular conjunctiva became inflamed and swelled, so as to completely cover the cornea which was opaque; the conjunctiva of the right eye was also congested. In a month after the injury, the wound was completely healed, but the opacity of the left cornea remained as ever, and the sight was not restored; the inflammation of the conjunctiva declined, but pain in the eye was present. After a time, the inflammation gradually abated, but the left eye withered by degrees, and the right eye was inclined to become inflamed. The left eye was enucleated and an artificial eye put in. The left eye ball was atrophied and all the tissues shriveled. The right eye became restored to its normal state, and the patient left the hospital 4 months after the injury. (No. 109.)

There were 23 cases of contused wounds caused by wooden splinters which if proportioned to 58 cases, the total number of various wounds occasioned by the same cause, will give a ratio of 39.66 per cent, and so are the most numerous among the various wounds inflicted by splinters. Thus we can see that this ratio is larger, than that of the contused wounds caused by shell-fragments, and about the same as that of the contused wounds produced by iron-pieces. This is because wooden splinters being weaker in force than the iron-pieces, most of the splinters will not do more than produce either contused wounds or contusions. Therefore, if the united number of contusions and contused wounds caused by wooden splinters, be compared to the total number of various wounds produced by the same, the former will bear a ratio of 68.97 per cent, which is much larger than the 40.14 per cent, the equivalent ratio of wounds caused by shell-fragments, and than 50.00 per cent which is that of iron-pieces. The reasons why wooden splinters inflict contusions in some cases, and contused wounds in others depend on the following conditions :—firstly, difference of force according to size, even among splinters originally weak in power; secondly, existence of ragged edges; thirdly, the locality of the part struck, for, if the part struck is wanting in soft subcutaneous tissues and so does not allow the skin to yield, it is liable to be rent open and sustain a contused wound, while the part which abounds in soft tissues yielding to the pressure will naturally escape rupture. Of 23 wounds as stated just now, 17 were in localities wanting subcutaneous tissues, such as the head, face, fingers, front of the leg and dorsum of the foot, and of the 17 wounds, 12 were on the head and face, none of them, however, was fatal as would be the case with a shell-fragment or an iron-piece, this proves the weak force of the wooden splinters. The 1st example of contused wounds caused by wooden splinters was in the lower part of the left parietal region. The wound was shallow, so that the aponeurosis was not pierced, but paralysis of the right side of the face, tongue, and the upper and lower limbs supervened, and amnesia was present; this was certainly attributable to the injury of the cortical substance of the brain around the fissure of Rolando; but what was the nature of it could not be ascertained. In this case the contused wound of the scalp was shallow, and did not pierce the aponeurosis and bone lesion was not found even if it existed, but such a wound, if caused by a somewhat larger and heavier splinter, might have broken the parietal bone beneath, without the aponeurosis being pierced, and such cracks may escape observation from the outside. Besides, it may be presumed that one of the anterior branches of the middle meningeal artery, running in the grooves of the inner surface of the parietal bone was ruptured at the same time, and thus an extravasation of blood between the bone and *dura mater* in the neighbourhood of the fissure of Rolando caused the hemiplegia of the opposite side. Considered from the situation of the scalp wound, there is reason enough to account for the above statement. However, the fact that in the course of two months, the symptoms gradually abated and at length disappeared does not agree with the usual course of the hæmorrhage of the middle meningeal artery. Such hæmorrhage is, as a rule, a serious case, in which symptoms of cerebral compression gradually arising, mostly results in death. At best, hemiplegia of the opposite side will persist. Therefore, if the case in question was due to the hæmorrhage of the artery, we can only attribute it to a slight bleeding from a small branch of the said blood vessel. However, as with the case *i* of the contused wound caused by shell fragments, owing to the death of all the surgeons on board, the clinical record of this case is imperfect, and it is not known whether there existed symptoms of concussion, compression, and spasm on the paralyzed side; so, these are the possible causes :—pressure by hæmorrhage of the artery; contusion of the brain; injury of the cerebral substance by a piece of bone broken off on the inner plate of the skull, or septic inflammation in the skull at the part struck, yet, judging from the symptoms and course as far as were known, it is most likely that a depressed fracture or a septic inflammation was not the cause.

(4) Cases of contused wounds, sustained by persons who happened to be near where shells exploded in which the cause might be attributable to various kinds of fragments, that is, those of wooden and iron materials of the ship, as well as of shells, are as follows :—

1st example.—A man acting as carrier of the wounded had brought a patient to the surgery in the ward-room on the lower deck, when a 30.5 c.m. shell exploded against the mizzen-mast in the room and killed the carrier by inflicting contused and lacerated wounds on the head, face, trunk and limbs, and also burns all over the body. (No. 29.)

2nd example.—A man who was struck by shell fragments as well as splinters sustained compound fracture of the face and base of cranium, and a large contused lacerated wound attended with fractures of the lower and upper limbs. The man was killed on the spot. (No. 54.)

3rd example.—Was a large contused lacerated wound in the middle of the right thigh, by the same cause as above. The soft tissues were very much severed, and the femur was smashed to pieces, besides, serious contused lacerated wounds were inflicted on the right arm and right side of the chest. The shock killed him instantly.

4th example.—Was a large contused lacerated wound accompanied with fracture at the middle of the right femur by the same cause as the last, and a perforated wound of the abdomen. The injured man died on the spot. (No. 174.)

5th example.—From the same cause as the last, a contused lacerated wound 5 c.m. long reaching the pericranium in the vertex, a small sized contused wound as deep as the above, below the left mastoid process of the occiput, a large contused lacerated wound which smashed the tibia and fibula at the upper third of the right leg, several wounds with loss of substance at the lower third of the right thigh, and a deep contused wound with loss of substance just above the left patella were received; and in addition to these, there was a contusion on the left temporal region, and burns all over the face. In a few days the injured man began to show signs of traumatic delirium, his mind was confused and he was restless, his temperature rose to 39° C., the right leg became gangrenous from stoppage of circulation, so amputation was performed at the lower part of the thigh. The delirium continued as before, and the patient died on the following day, that is, the fourth day after the injury. (No. 288.)

These are the cases of which the real causes could not be ascertained as they occurred in the surgery of the Hiyei, where a 30.5 c.m. shell exploded, breaking the iron-mast and smashing the tables and various surgical instruments, and drove the various fragments on all sides, so that it was practically impossible to ascertain which of these caused each of the above stated cases. The number of the wounds of this category is 20 occurring in 5 persons, of which 4 persons were killed on the spot and 1 person died on the fourth day of injury. Each of these persons sustained many contused lacerated wounds, of which the serious ones seem to have been caused by shell fragments, but as there were other iron-pieces that were large and heavy, clear discrimination can not of course be made. Those who were injured by being near where a shell explosion occurred, were not only struck by shell fragments, or iron and wooden splinters, but were liable to sustain other wounds from the expansive power of the gas, or from the flame. The latter kinds of wounds are often dwelt on under a special head. "The Explosive wounds," and therefore we shall treat of it under the subject of the crushed and mutilated wounds produced by the same cause.

(5) There were 12 contused wounds in which the cause of the wound was not ascertained, whether by iron fragments or wooden splinters.

1st example:—A cook was struck by iron and wooden pieces which were produced by the destruction of the lower deck by a hostile shell, and sustained a contused wound 3 c. m. long and 1 c. m. wide on the upper lip, and a contused wound 10 c. m. in length and 1 c. m. in width extending from the right ear to the right side of the neck, and small contused wounds, one each on the right eye-brow and cheek, and 3 small contused wounds on the left index finger, and a contused wound 2 c. m. square on the outer side of the middle of the right thigh, and another, 4 c. m. square, behind the right elbow joint. In each of them, the margins were irregularly lacerated, presenting a purple colour, threatening suppuration, all the wounds were cured within a fortnight. (No. 98.)

2nd example :—Was a contused wound on the outer side in the middle of the right arm by iron and wooden pieces, which suppurated, and at last were healed after 6 weeks. This man was the same as the 3rd example of contusions caused by splinters.

(6) Instances of contused wounds caused by a fall produced by shock are as follows :

Contused wounds caused by the fall produced by shock of a shell striking an iron wall near by, were inflicted in the left hypochondriac region and in the left calf. The shock made him unconscious, but when he came to himself, the wounds were dressed and he resumed his duty. After a little while another shell exploded on the lower deck in the fore part, setting a large amount of the gun powder on fire, and he was again thrown down, and struck by a shell-fragment on the back of the parietal region, and he sustained a small contused wound. The latter was cured in a few days, while those on the hypochondrium and the calf suppurated, and were at last healed after seven weeks. (No. 138.)

Besides this, there were cases of small contused wounds on the lumbar and iliac regions and in the front of the right ear.

The number of the contused wounds caused by the fall consequent to shock is 5, and the wounds produced by this cause are only contused wounds and contusions. Of these, the latter are by far the more numerous as already stated, amounting to 73.68 per cent of the united number, and the former were only, 26.32 per cent. It is natural that contusions should occupy so large a space, for the contused wound is produced only, when one happens to fall on an object having acute edges.

(7) Contused wounds owing to compression and collision were two ; one was a case of crushed finger caused by tumbling down from the shock of the firing, the other a case of contused wound of the fingers from colliding with the keen edges of a hole made by a shell in the ship's side. As has been stated, the entire number of contused wounds were 184, which proportioned to 629, the total number of various kinds of wounds, bear a ratio of 29.25 per cent, thus standing the highest among all kinds of injuries. And if we classify these 184, their causes will be as follows :—97 wounds from shell fragments ; 25 from metal pieces ; 23 from wooden splinters ; 20 from unknown material whether shell fragments, iron or wooden pieces ; 5 from being thrown down by shock ; 12 either from iron pieces or

wooden splinters; one from compression and one from collision. It is natural that contused wounds should reach the largest total in a naval combat. As the contused wound is a contusion attended with the destruction of the skin, the object which produces it must have two requisites : Firstly, it must have a force, that is, velocity or weight, large enough to ruin the skin and other tissues. Now, in the naval combat, both shell-fragments and iron or wooden pieces which are the chief missiles, have coarse surfaces and at the same time are heavy; and besides, as they very seldom strike persons at a distance, their velocity even though originally not so great, has more than sufficient power, when combined with their weight to produce this kind of wounds. Secondly, the object must be a body which though it ruins the skin and other tissues is not capable of penetrating. Now the shell-fragments to be seen in the naval combat, are not only mostly large in form, but are extremely irregular in shape having a coarse surface ; and therefore, they possess a sufficient force to destroy the skin and tissues, but are quite unable to penetrate the tissues or perforate them. Moreover, as the shell-fragments and pieces of iron or wooden materials possess an irregular shape, some of them may have sharp edges together with a rough surface, and such may be small in form, and devoid of weight and velocity, so that they have not sufficient force to penetrate into the tissues after striking the skin ; yet by breaking open the skin they do often produce contused wounds. This is especially the case when they strike parts wanting subcutaneous soft tissues, like the head, or the front of the leg. And sometimes there occur cases of contused wounds from other causes ; for instance, colliding with various objects when thrown against them by the shock of an explosion, etc. Therefore, it is no wonder that the wounds of the kind under consideration should be most numerous.

4.—BLIND AND PENETRATING WOUNDS.

(1) Blind and penetrating wounds caused by shell-fragments:—in this group there were 57 wounds, occurring in 41 persons, of which some of the interesting cases are as follows :

1st example :—7 persons were killed on the spot, owing to penetrating wounds of the head caused by the fragments of shell, and 1 person died within the day of injury from the same cause. (Nos. 45, 55, 56, 57, 58, 61, 62, 63.)

2nd example :—Penetrating wound in the left side of umbilicus. When admitted to the hospital, four days after the injury, the symptoms of diffuse peritonitis were marked : the abdomen was tympanitic with nausea and vomiting, ejecting a blackish fluid, and abdominal pain was also intense, the general strength of the patient was failing, and at last he succumbed. (No. 163.)

3rd example :—A shell fragment penetrated into the abdominal cavity, crushing the anterior superior spine of the right ilium, and the intestine protruded from the wound. The injured man was killed on the spot. (No. 166.)

4th example :—A penetrating wound in the umbilical region with protrusion of small intestine. The man also sustained a small blind wound in the left thigh. He was killed on the spot. (No. 164.)

5th example :—A case of penetrating wound below the umbilicus with protrusion of the intestine ; also, on the right upper arm as well as the left thigh and leg, extensive contused lacerated wounds with fractures of the bones. The injured man was killed on the spot from shock. (No. 165.)

6th example :—A case of blind wound in the middle third of the right leg. After admission to the hospital, a shell fragment 2.7 c.m. in length, 1.7 c.m. in width, and 1.5 c.m. in thickness was extracted, and the wound was healed in 5 weeks. (No. 280.)

7th example :—A case of blind wound in the middle of the left upper arm. It reached the bone, but without injuring it. There was also, a blind wound in the left forearm which crushed the upper part of the ulna with lodgement of shell fragment in the bottom of the wound ; the brachial artery was ruptured at its bifurcation, but hæmorrhage was not copious. Pulsations of the radial and ulnar arteries were entirely lost. When admitted to the Sasebo Naval Hospital 4 days after the injury, the left forearm was already mortified. Accordingly, the upper arm was amputated at its middle part; and the stump was healed in 12 weeks. The injured man was then invalided for life. (No. 224.)

8th example:—In the upper part of the right thigh, a blind wound was inflicted, together with a perforating wound of the right shoulder attended by the fracture of the scapula. The blind wound of the right thigh was situated just below the Poupart's ligament; the wound canal, taking an inward and downward direction, measured 6 c.m. in depth; and the inlet was a mere fissure hardly admitting the tip of the thumb; at the bottom, a shell fragment was found and extracted. The wound was healed in 6 weeks. (No. 193.)

9th example:—In front of the neck, there was a blind wound, by which the trachea and the œsophagus were both rent open, and the right common carotid artery being also injured, the injured man succumbed on the spot. (No. 127.)

10th example:—Just below the Poupart's ligament, a transverse lacerated wound measuring 4.5 c.m. in length and 10 c.m. in depth; at the bottom, a shell fragment was found, which being taken out measured 5 c.m. in length, 2.5 c.m. in width in its widest part, and 1.5 c.m. in thickness, a piece of cloth was firmly sticking to a part of the surface of the fragment. The wound was suppurated, but finally healed in more than 4 months. (No. 254.)

11th example:—Along the 10th rib in the dorsal aspect of the left side of the chest, a penetrating wound 15 c.m. long and 5 c.m. wide, running obliquely along the rib and in the lower margin of the wound. The rib was broken and the lung injured, so that an emphysema resulted in the tissues around the wound. The man also sustained perforated wounds of both arms, and several lacerated wounds over the body and limbs. After a time, the subcutaneous emphysema in the back had gradually extended to the abdomen and scrotum, it however disappeared after some ten days, without causing any marked interference, when the wound orifice was closed by the development of healthy granulation. The wound was completely healed in 8 weeks. (No. 209.)

12th example:—At the juncture of the middle and the lower third of the right thigh, a blind wound. The femur was obliquely fractured and a shell fragment was lodged under the skin of the opposite side. Accordingly the skin was cut open, and an irregular cuboid shell fragment 2.3 c.m. long, 1.8 c.m. wide and 1.5 c.m. thick was extracted. The wound suppurated, and three pieces of the broken bone were taken out. After that, the wound progressed favourably and healed in 7 weeks. (No. 259.)

13th example :—Owing to the explosion of a hostile shell in the turret, there were inflicted two lacerated wounds in the lower part of the left forearm; the radius was broken, and a foreign body was lodged in the bottom of the wound: The orifice of the wound was therefore widened and a shell fragment 1.5 c.m. in diameter was extracted. There were also burns in the right temporal region with rupture of the right membrana tympanum. Afterwards, several pieces of the broken bone came out of the wound of the forearm; suppuration continued a long time and the complete healing of the wound required six months. (No. 225.)

14th example :—A case of blind wound on the back of the left thigh, the wound canal measured 10 c.m.; at the bottom, was lodged an irregular oblong shell fragment 3 c.m. long, 2 c.m. wide and 1 c.m. thick, which was extracted after admission to the hospital. Afterwards, the canal suppurated, assuming a fistulous condition, and constantly discharged pus. The sinus walls were frequently scraped; the healing process however, was so slow that it required altogether eleven months to heal. (No. 255.)

15th example :—A case of blind wound in the upper part of the right upper arm; and another one in the lower part of the right forearm. The former wound reached to the surgical neck of the humerus, where a shell fragment was found wedged into the bone substance. The wound in the forearm fractured the radius, but the presence of a foreign body was uncertain. However, after admission to the hospital, the wound was widened and an irregular shell fragment 2 c.m. long, 1.5 c.m. wide, and 6 m.m. thick was found and extracted. Both wounds suppurated, and that of the forearm was healed in the course of 7 weeks and that of the upper arm in 5 months. (No. 208.)

16th example :—A case of blind wound on the inner side of the right ankle, a shell fragment wedged into the tissues which the man extracted himself as a part of the fragment was exposed. The tibia was not broken. The wound was healed in five weeks. (No. 302.)

17th example :—A case of penetrating wound of the right knee joint, the tendon of quadriceps extensor and patella were broken, and fragments of shell and bone retained in the joint cavity, but both the femur and tibia were intact. The injured man also sustained several lacerated wounds on the head, face and upper limbs. The wound of the knee suppurated, and healed in 5 months, leaving ankylosis of the joint. He was permanently discharged from service. (No. 271.)

18th example:—Owing to the explosion of a shell, one of the small fragments penetrated into the left eye ball at the inner canthus; at the same time the burns on the face were sustained. A small blind wound on the inner surface of the upper third of the left leg was also inflicted, which measured 7 c.m. in depth and a foreign body was present at the bottom, which was extracted by making a counter opening. The body proved to be a metal piece, the size of tip of the thumb. The left ocular conjunctiva was inflamed and the anterior chamber filled with a dark reddish fluid, the pupilary region presented a yellowish hue and the vision was completely lost. The conjunctiva of the right eye was congested and the sight was somewhat impaired. The wound of the leg was healed in 3 months. Nevertheless, the sight of the left eye was not restored at all, and the irritative congestion of the conjunctiva in the same eye still persistently remained, with gradual shrinking of the eye ball. The sight of the right eye was restored a little, but whenever the patient gazed at an object, muscæ volitantes were soon complained of. As the left eye presented no hope of recovery, it was enucleated and an artificial eye was put on. A small shell fragment weighing 0.95 gramme was found lodged between the choroid and the serelotic at the back part of the eye-ball, The injured man was discharged from service for life. (No. 111.)

19th example:—A case of penetrating wound of the back, below the left scapula, breaking the ribs. Dyspnœa and great pain in the left side of the chest was complained of, in the movement of the body and respirations. When pressed, the margins of the wound gave a sensation as if snow were compressed, owing to subcutaneous emphysema. From the wound, at each respiratory movement, blood mixed with air bubbles came out. In the night, præcordial uneasiness, dyspnœa and pain in the chest were so severe, that the patient could not have a sound sleep. The temperature rose to 38° C.; urine was drawn by catheter. At the time of admission to the hospital on the fourth day after injury, coughing was incessant and a sputum stained with blood was expectorated. There was intense pain in the chest and the subcutaneous emphysema extended from the left scapular region to the axilla. On percussion, a slight dulness was revealed in the lower part of the left side of the chest. The cough and emphysema gradually subsided; the bloody expectorations disappeared, the pain in the chest also abated by degrees, and the patient entirely recovered in 2 months. (No. 144.)

20th example :—A case of blind wounds in the lower third of the right thigh and in the dorsum of the right foot. In the former wound, a fragment of shell was found and extracted ; the latter wound crushed 1st and 2nd metatarsal bones, which were excised, three small shell fragments being found at the bottom. The former wound healed in 3 months, the latter, in 7 weeks. The patient was discharged from service as his walking power was impaired. (No. 305.)

21st example :—A gaping wound extending from the middle of the forehead to the bridge of the nose ; and thus the nasal spine of the frontal bone, nasal bones, the nasal process of the superior maxillary bone, and a part of the perpendicular plate of the ethmoid were smashed. The wound presented a cavity, in which were lodged pieces of the bones and the shell fragment. The right orbit was filled with extravasated blood and the eye-lids were strikingly swollen that they presented a dark purple colour and one eye could not be opened. At the lower part of the right orbit, and on the right cheek, blind wounds were found, the latter containing a shell fragment as large as the tip of the thumb. Further, at the inner side of the right ankle was found a blind wound. When examined at the hospital, the right half of the face was greatly swollen and the eye of the same side could not be opened, the left eye was slightly swollen, and the conjunctiva a little congested. At the bottom of the wound in the right cheek, there was present a foreign body, which was extracted by enlarging the inlet and proved to be a small shell fragment. On examination, the right pupil was found dilated, and the sight greatly impaired, and in the fundus, detachment of the retina was recognized. Besides, anæsthesia in the right side of the forehead, temple and cheek was present. Also, a small shell fragment was extracted from the wound of the right ankle. All the wounds were gradually healing and the sight of the right eye was restored in some degree, but external strabismus and double vision were left. The wound of the nose was healed by rhinoplasticy ; but the anæsthesia in the cheek and temple persisted as ever. The man was discharged from service. (No. 106.)

22nd example :—On the outer side of the lower part of the right upper arm was a lacerated wound 5 c.m. long and 3 c.m. wide. At its bottom, the periosteum of the humerus was found detached, and the bone fissured in a star like shape, but no shell fragment was found. Several contused wounds were also inflicted on the head, face, and upper and lower limbs. These wounds were all healed in two months, but ankylosis of the right elbow joint resulted, and the patient was discharged from service. (No. 207.)

23rd example :—At the lower part of the right scapular region was sustained a small blind wound which was clogged with rent pieces of cloth. The cloth was extracted, the wound developed healthy granulation and the inlet healed in 2 weeks. A hard body being however felt at the part 3 c.m. from the inlet, it was extracted by cutting upon the part, and proved to be a small shell fragment of a square form 6 m.m. in diameter. (No. 141.)

24th example :—A case of blind wounds on the inner side of the upper part of the right arm, on the posterior surface in the middle of the left forearm and on the ulnar side of the back of the left wrist. At the bottom of each wound were lodged shell fragments. Besides perforated and lacerated wounds were inflicted in various parts of the body and limbs. The wound of the upper arm was healed in due course of time, yet the loss of the use of the fingers consequent on another wound placed him on the list of the invalided. (No. 229.)

25th example :—At the middle of the posterior surface of the left leg a lacerated wound was sustained 3 c.m. long and 1.2 c.m. wide, running obliquely from upwards and outwards, to inwards and downwards. This afterwards suppurated, delaying the healing process. On minute examination, the wound canal had 6 c.m. depth in a forward and downward direction, and a hard body was found at the bottom, which on removal, proved to be a cuboid shell fragment 2 c.m. in diameter. This was wedged between the tibia and fibula, giving several fissures to the bones but without breaking them entirely. Progress of the wound was favorable and healed in 5 weeks. (No. 287.)

26th example :—A case of blind wound on the left side of the chest, below the nipple. The wound reached to the rib ; but hæmorrhage was slight, though the injured person fainted owing to shock. After admission to the hospital, a foreign body was found within the wound, and by enlarging the inlet a small shell fragment was removed. The periosteum of the rib was detached but the bone was sound. The incised part was sutured and a drainage tube inserted. Granulation was unhealthy with a slight discharge of pus, the healing process was very dull, so the granulation was scraped off, but the wound became fistulous and the recovery seemed uncertain.

On enquiry, the injured man had a syphilitic history; accordingly anti-syphilitic. measures were taken and after a lapse of 7 months the wound was at last cured (No. 139.)

27th example :—A case of penetrating wound of the forehead. The scalp wound was 2 c.m. long and half as wide, and the bone was perforated with a round hole some 1 c.m. in diameter, the presence of a foreign body could not be ascertained; and no brain symptoms existed. Four days after the injury he was admitted to the hospital, when the wound was clean, granulations healthy without any signs of suppuration, and no cerebral symptoms were present, except nocturnal sleeplessness. The temperature rose to 38.° 5 C. but soon lowered to normal. In a week after admission to the hospital, the patient complained of headache attended with a slight nausea and sleeplessness at night. Ice-bags to the head and calomel purgative were used, and in a few days the headache subsided, the mind became clear, and the appetite increased. Ten days after, occasional tinnitus aurium was complained of; the temperature was normal, but pulse slow counting 55 per minute. For some time, there was no marked change in the symptoms, however 15 days afterwards, the headache and tinnitus aurium became aggravated; chilliness and fever set in, the temperature rose to 38.° 3 C. From the wound in the forehead a slight discharge of pus appeared and the symptoms of brain compression gradually ensued. Accordingly trephining was performed and an abscess in the frontal region was found, however, the locality of shell-fragment was not ascertained. The abscess was well washed with boracic lotion and a drainage tube inserted, after which the temperature abated somewhat and the subjective symptoms were relieved; but 3 days after, the temperature again rose to 39° C., the pulse weak and quick counting 148, the respirations stertorous; the mind became dull, speech unintelligible, the eyes squinted, the pupils were unequal in size, and at length, the patient expired on the following day. (No. 59.)

28th example :—A case of penetrating wound on the right side of the chest below the axilla. Also, a blind wound on the inner side of the lower third of the left leg, which reached beneath the skin on the opposite side, where a foreign body was lodged. By opening the skin, a shell fragment 3 c.m. in vertical diameter, 1.6 c.m. in lateral diameter and 1.2 c.m. in thickness was taken out. The patient was admitted to the hospital 4 days after the injury, when the wound on the chest emitted a yellow thin fluid. There was pain in the chest and cough. The broken ends of the 10th rib were sharp and jagged, and were accordingly cut off. Further examination of the wound showed that the liver was perforated but the locality of the shell fragment was not known; the temperature was normal. Discharge of a thin bilious fluid from the wound had not ceased, and the granulation was unhealthy. On examination ten days after, a small flat piece of broken rib was found and extracted. Sloughed hepatic tissues were discharged from the wound. Subsequently an oral elevation in the right side of the 1st and 2nd lumbar vertebræ was accidentally found, which gave a sense of hard body under the skin. By cutting the part open an irregular oblong shell-fragment 1.8 c.m. long, 1.1 c.m. wide, and 5 m. m. thick was obtained. This is perhaps a fragment which perforated the liver from the right side of the chest and lodged here. For some days discharge of a bilious fluid continued, occasionally mixed with debris of the liver, but it gradually diminished, and the granulation was improving, when suddenly the temperature rose to 39° C., on examining the wound, a small sequestrum and debris of the liver was found impacted in the wound, so that a thin pus was accumulating. These were accordingly removed, and the wound washed, when the temperature returned to normal, and from that time the course was favorable, and all the wounds were cured in more than one hundred days. (No. 161.)

29th example :—A case of penetrating wound in the left side of the chest below the axilla. The wound took a downward and forward course, breaking the 10th rib, and entered the thoracic cavity. On the next day, sudden pain was complained of in the abdomen and the temperature rose to 38° C.; on the following day the abdominal pain became much more severe attended with vomiting. When the patient was admitted to the hospital four days after the injury, the vomiting still existed, the abdomen was tympanitic, the pain extreme, and the general strength greatly exhausted, exhibiting spmptoms of peritonitis. Also, the patient had a slight cough, spitting a small quantity of bloody sputum. The signs of peritonitis aggravated day after day: the abdomen was very tympanitic, the pain in the chest and the bloody sputum persisted, and pus was discharged from the wound. On the 5th day after admission to the hospital, he succumbed to exhaustion. (No. 162.)

30th example :—A case of penetrating wound on the right side of the chest, breaking the 7th and 8th ribs; besides, the heel of the right foot was crushed, and burns on the head, face, and upper and lower extremities inflicted. On the next day, pneumothorax and subcutaneous emphysema of the chest set in causing dyspnœa and the patient at length died. (No. 321.)

If the 57 cases of blind and penetrating wounds produced by shell-fragments be proportioned to 289 cases, the total number of various wounds caused by the same missiles, the percentage will be 19.72. This ratio is smaller than 33.56 per cent of contused wounds, but is larger than 6.57 per cent of contusions, 16.26 per cent of abrased wounds, 11.42 per cent of perforated wounds, or 9.34 per cent of mutilated wounds, etc. Thus this class of wound occupies the second place amongst the various wounds caused by shell fragments. This is for the reason that the shell-fragments, though not increased in penetrating power by their irregular shape, yet have as a rule, a stronger force than iron or wooden pieces, and accordingly not only penetrate the soft tissues, but frequently destroy both hard and soft tissues, except when the fragments are either not very large or they have struck the skin with a flat surface. Compared with iron and wooden pieces, shell fragments are by far the more numerous causes of various wounds, so naturally every kind of wound is produced more by shell-fragments than by any other projectiles. This is especially the case with the blind and the penetrating wounds, for of these wounds 72.15 per cent were caused by shell-fragments, while other metallic pieces bore a ratio of 15.19 per cent, and wooden splinters 6.33 per cent ; so it will be seen that in this class of wounds shell-fragments proved to be by far the greatest cause of wounds.

The orifices of the blind and penetrating wounds in the skin have various shapes, just as there are sundry shapes and sizes of shell-fragments ; but considered in general, the wounds under this category usually have a lacerated form, attended with more or less loss of substance, the margins being irregularly lacerated and the tissues around sustaining contusion. The lacerated appearance is caused as follows:—when the shell-fragment, which is not originally so great in velocity, strikes the skin, the latter with its elasticity yields under the pressure, and is rent open when it is stretched to the utmost, so that the part touched by the fragment is not punched off clean ; the remaining part assumes a lacerated form when the skin springs back to its normal state, accordingly as the tissues around the wound orifice sustain contusion owing to pressure, the size of the orifice is generally smaller than the size of the shell-fragment. In the clinical history, there are many cases in which nothing is said about the relative size of the fragments and the wound orifice made by them, so that we can not give particulars in every case ; however, from what we can judge from the recorded cases, the orifices are, as a rule, smaller than the shell-fragments. This can be proved by examples Nos. 8, 10, 13, 14, 18, 20, 21, 24, and 28. But when a part where the bone is superficially located is struck by a shell-fragment, the skin, being unable to yield sufficiently, is liable to be crushed ; in such cases the wound orifice does not present a lacerated form, but according to the shape of the fragment, it may be an irregular square, an irregular round, or an irregular oblong. This is exemplified by Nos. 15, 21, 22, and 24. Again, even at a part rich in soft tissues, the tissues themselves afford more or less resistance, not as with the exit of a perforated wound, where there is no outward resistance ; hence the tissues are rent open after they have been stretched to the utmost, and the entrance orifices do not present simply a lacerated appearance, but are always attended with more or less loss of substance. There are also some cases in which the length of the orifice is longer than the longest diameter of the shell-fragment which has produced it, as is exemplified by Nos. 6, 11, 19, 23, and 25, etc. This is produced by the fragment striking the skin in a slanting direction, so that it first glances along the skin, and then enters deep into the tissues. This was especially the case with No. 11 in which a lacerated wound 15 c.m. long and 5 c.m. wide was produced, at its lower part breaking a portion of the 10th rib and injuring the lung. The size of the shell-fragment was not known, as its location was not ascertained ; judging, however, from the slight damage done to the rib, it was plain that it was not actually so large as to produce a wound 15 c.m. in length, and the dimension of the wound can only be accounted for by the oblique direction of the fragment. Seeing, however, that the wound was not only long, but had also a width of 5 c.m., we feel justified in making the assertion that the fragment was not a small one. Moreover, from the presence of a marked subcutaneous emphysema the lung was undoubtedly injured, yet from the fact that no hæmoptysis nor signs of the penetration of a fragment into the lung nor pain in the chest nor signs of pleuritis were present, we must infer that the fragment having partly penetrated into the tissues fell out of its own accord, and that the injury to the lung was caused by some pieces of the broken rib. As the shape of wound orifices differ, the margins are not necessarily irregularly lacerated, but sometimes are clean and sharp as if cut by a keen edge, as in cases 24 and 25. This was due either to the fragments having keen edges all around, or to the high velocity of the fragments, or to the lack of subcutaneous soft tissues at the part struck, otherwise to the stretched state of the muscles and fascia at the time struck.

The blind wounds caused by shell-fragments were not seldom attended with fractures. The 8 cases of the penetrating wounds of the skull mentioned in the 1st example, and one in No. 27 will specially be treated later on. Other examples attended with fractures may be seen in Nos. 11, 12, 13, and 15 (wounds of the forearm) and in Nos. 19, 20, 28, and 29. Of these Nos. 11, 19, 28, 29, and 30 were attended with fractures of the ribs, Nos. 12 and 20 of the femur and Nos. 13 and 15 of the radius. These injuries of bones show that the shell-fragments were not very weak in force. On the other hand, there are cases in which though the fragment reached the bone, yet broke only a part of the bone, or gave no injury at all, thus indicating the weak force of the fragment. This is seen in Nos. 7, 15, 16, 17, 21, 22, and 25. Circumscribed fracture of a bone in the neighborhood of the part struck by the fragment is of very rare occurrence in rifle wounds, while not unfrequent in gunshot wounds. This is owing to the fact that, in the latter case, the projectile is generally weak in force, and possesses an irregular shape and keen margins. This was especially the case with example No. 15, in which although the shell-fragment was wedged into the surgical neck of the humerus, yet the fissures being limited to a small part, the bone was not entirely broken. Also, in No. 22 radiating fissures were produced in the bone for a little distance, no shell-fragment remaining behind. This was perhaps because the fragment being rather large (from the size of the wound we infer that it was not small), only a part of it penetrated the tissues and hit the bone inflicting merely a slight injury owing to insufficiency of force, and that a larger part of it remaining outside, it fell off of its own accord. A remarkable instance of a shell-fragment partly penetrating the tissues, the rest remaining outside, occurred in example No. 16. The fragment struck the front of the inner ankle of the right foot, reaching down to the bone, but one half of it remained exposed, so the injured man pulled it out by himself. The 22nd and 11th examples of these wounds, and 6th example of contused wounds by shell fragments, and 1st, 3rd, and 4th examples of contused wounds by iron pieces are almost the same in their nature, so that it is hard to decide whether they ought really to be classed as contused wounds or as blind, and for the present they are classified according to the names reported from different ships. The eight cases of penetrating wounds of the skull in the 1st example all died instantaneously except one, and it is doubtful whether the shell-fragments really penetrated into the skull or not, however, there is no means of investigating the condition of the wounds, as the reports on them are so brief. One case, which survived for a few hours received 3 lacerated wounds in the forehead, all attended with fractures of the bone ; one near the border of the hair communicated with the cranial cavity as is seen in the illustration of case No. 45 ; and a part of the bone being missing the crushed brain substance came out of the hole together with blood. The aperture in the skin compared with those of the other two wounds was narrow, so that it might as well be regarded as a penetrating wound ; but that could not be certainly affirmed, as the location of the shell-fragment was not ascertained. However, considered in another way, it may be explained thus : the cracks of the bone extended over a pretty wide area, so that they seemed to have been produced simultaneously with the other two wounds by a very heavy shell-fragment. Moreover the hole in the skin was not large, yet presented a lacerated form, so from all these facts, we may infer that it may not have been a penetrating wound, but a so-called contused wound attended with fracture, and that the loss of a part of the bone was because of the falling in of the broken pieces of bone, by which the brain substance was also injured. Example No. 27 also, though the location of the shell-fragment was not ascertained, was obviously a penetrating wound. For the skin hole on the forehead had the appearance of a small laceration, and the bone was perforated with a round hole some 1 c.m. in diameter, as is shown in the illustration of the clinical history, with cracks neither in the inner nor on the outer plates of the bone around ; so it is plain that this must have been caused by a penetrating wound. What was the actual form of the fragment, can of course not be ascertained now, yet as shell-fragments have as a rule irregular shapes, with several edges, and are never so round and smooth as bullets, we can easily imagine that the shell-fragment that produced the wound in question was likewise of an irregular shape. The fact that the wound in the forehead was almost round, and that the inner as well as the outer plates sustained no cracks, proves that the shell-fragment was very weak in force. Even with bullets, they produce such simple lesions to bone when they come from a great distance, and with greatly impaired velocity. For the same reason, it seems that this fragment being weak in force, could scarcely penetrate the frontal bone, but as it spent all its force, it stopped near the dura mater without injuring the brain substance. There may occasionally be cases of no occurrence of cerebral symptoms even when the frontal lobes were injured, but in the present case the fragment seems not to have entered the cranial cavity as no foreign body was found after the trephining. At any rate, it is very strange that no brain symptoms occurred for some days after injury. But unfortunately the wound fell into suppuration and an abscess was formed in the skull, from which the patient died, the operation proving ineffective.

The instances of the presence of pieces of cloth in the wounds were Nos. 10, 12, 14, 23, and 28. In 3 of these cases, the shell-fragments had pieces of cloth sticking to one side only. It can easily be seen that this is not only the case with the shell-fragment, but also with an iron or wooden piece having a very irregular shape and coarse surface, when striking a part covered with cloth ; and in most of the blind wounds received in those parts of the body covered with clothes, this was undoubtedly the case even in the instances where no record is made of the presence of cloth. For in the treatments during battle or directly after, there are not a few instances in which though a piece of cloth was taken out of wounds, yet no record of it was made. Also there may have been cases in which such pieces were taken out when the wounds were washed afterwards, which however was not recorded having escaped observation of the surgeons, and accordingly much to our regret, it is impossible to discuss this matter statistically.

Instances in which shell-fragments stopped beneath the skin on the opposite side, were seen in Nos. 12, 18, and 28. Of these, in No. 12, the shell-fragment was powerful enough to crush the femur, and in No. 18 it entered the side of the lumbar vertebræ breaking the ribs from the side of the chest, yet in neither case was there strength enough to pierce the skin from within. At first sight, such cases may appear to be exceptional, but the skin on the opposite side, having no support, can be stretched by pressure from within owing to its elasticity and a certain force is needed for piercing it through, and consequently, cases in which shell-fragments stop beneath the skin on the opposite side are not regarded as curious in military surgery.

There was a case in which several shell-fragments were found lodging in a single wound. This was seen by the blind wound of the right foot in example No. 20. It was not that three fragments of shell in the wound entered at one time—a single fragment entered the wound and split into three on striking the bone. Such examples were found in other cases.

A case in which cause of death was probably due to hæmorrhage was seen in example No. 9. This was indeed a serious wound in the neck; the trachea, œsophagus and carotid artery were rent open, but no lesion was found in the cervical vertebræ, so instant death should not have occurred unless the right common carotid artery had been injured. This case will be further discussed later on.

Example No. 21 was a case of a penetrating wound in the nasal bridge. The wound communicated with the maxillary sinus, and destroyed the inner wall of the right orbit causing a contusion of the eye-ball and detachment of the retina, complicated with small blind wounds, one below the lower margin of the right orbit, and one on the right cheek. Subsequent occurrence of obstinate anæsthesia in the right cheek and temple, was due to the injury of the cutaneous branches of the third division of the trifacial nerve, accompanied the reflex paralysis of the auriculo-temporal branches. Such paralysis is not of rare occurrence in gunshot wounds.

Penetrating wounds of the abdomen were shown in Nos. 2, 3, 4 and 5. The patients all died except one. The size of the wound was not recorded in one case, but it destroyed the anterior superior spine of the right ilium; another case had a round aperture 3 c. m. in diameter near the umbilicus; and the third had also a round orifice the size of a 2 *sen* copper below the umbilicus. As the abdominal walls yield to a great extent by pressure it is frequently observed that a fragment larger than the wound orifice has entered into the cavity. The two instances above mentioned in which the sizes of the wound orifices are recorded, were similar round holes some 3 c. m. in diameter, and we may infer that in both cases the shell fragments were not small. Moreover, they must have injured the abdominal organs, as they certainly had irregular angular shapes; and it is obvious that all cases were serious. The instant death, however, in these cases should not be attributed only to injuries of the abdominal organs, but also to the subsequent occurrence of a severe shock or internal hæmorrhage, though unfortunately the results of investigation were not sufficient to show the real cause. In such wounds, a severe shock may be the sufficient cause for instant death, so it is not necessary to attribute the death to hæmorrhage. Also in example No. 2 in which instant death did not ensue, it is not certain whether there was a shock at the time or not, as this case occurred on board the Matsushima where numerous persons were either killed or injured at one time, and the surgeons were consequently too busily engaged to spare time for recording each case minutely. Indeed none of the first symptoms of any cases in that vessel can be clearly assertained, but the surgeons concerned in the treatment at that time told us afterwards, that there were many cases of violent shocks among the patients suffering from burns and other wounds. The position and size of the wound in No. 2 were nearly the same as those in Nos. 4 and 5, and it is plain that in this case also the abdominal organs must have been hurt ; the difference in the fate met with, may be attributable to the different severity of shock or internal hæmorrhage, though it may also be due to the condition of the injuries of the abdominal organs, in which in spite of severe injury to the internal organs, instant death can mostly be avoided if the shock be slight, without copious internal hæmorrhage at the same time. Such examples are seen elsewhere and will be dealt with further on.

The penetrating wounds of the chest by shell-fragments are shown in Nos. 11, 19, 28, 29, and 30. In the No. 11, the shell-fragment may not, as has already been pointed out, have penetrated into the thoracic cavity ; but in No. 19, the fact was plainly otherwise, that is, the fragment entered the cavity below the left scapula smashing the ribs, and consequently there ensued intense pain in the left hypochondriac region, dyspnœa, and subcutaneous emphysema around the wound, high temperature, and after a few days bloody expectorations. From the presence of severe pain in the hypochondriac region and subcutaneous emphysema, we may infer that the shell-fragment dropped into the pleural cavity after breaking the ribs ; it is plain that the lung was injured, however from the absence of hæmoptysis at the time of injury it can not be thought that the fragment injured the lung deep down. Probably the lung was either superficially hurt by some broken pieces of the ribs, or by a shell-fragment which did enter deep into the organ. The bloody expectorations which appeared a few days after and lasted pretty long, were probably consequent on the circumscribed pneumonia ensuing around the wound, and the disappearance of the pleurodynia was probably due to the fact that the shell-fragment was encysted in inflammatory products. In example No. 30, which occurred on the Matsushima, the ribs were certainly broken, and it was likewise evident from the existence of subcutaneous emphysema and pneumothorax that the lung was injured, but in the absence of any detailed record of symptoms, it is very uncertain whether the shell-fragment penetrated into the lung or not. The death of the patient on the following day, was because of the combined effects of extensive burns received at the same time.

The instances in which subcutaneous emphysema resulted were three, that is, Nos. 11, 19 and 30 ; and further, in the two examples 28 and 29, the 10th rib was broken. Yet as will be hereafter shown, the lung was injured only in one case. There was also a penetrating wound of the thoracic wall breaking the 5th and 6th ribs on the left side, in which it could not be ascertained whether the cause was a shell-fragment or an iron-piece. In this case, also the lung seemed not to have been injured. Besides these, there were seven cases of perforating wounds of the chest, all of which resulted in instant death so that we need not discuss about the existence of emphysema. To sum up, the penetrating and the perforating wounds of the thoracic cavity are 13 in all (cases of blind wounds of the thoracic wall in which the iron-pieces stopped at the ribs, are not counted in this number). Subtract from these seven cases of instant death, and there remain 6 cases. Of these 6 cases, 2 seemed to have escaped injury to the lung, and of the remaining 4 cases of lung injury, 3 were affected with subcutaneous emphysema. Emphysema is rarely met with in military surgery. Neudörfer says he met with only one in 200 cases of penetrating and perforated wounds of the chest, and Otis mentions no more than 38 out of 8,715 cases of the same wounds in the lungs which occurred during the Civil war in America. For in rifle wounds, the bullets have as a rule, a high velocity, so that not only do they frequently make perforated wounds, but even those bullets which are weakened in velocity and only strong enough to inflict penetrating wounds, enter into the lungs owing to their shape, which is peculiarly convenient for penetration, and produce gaping wounds in the lungs as well as the chest wall. They thus make it easy for the air to escape through the wounds, and hence it is rarely that emphysema is caused by bullet wounds. On the contrary, shell-fragments are as a rule weak in velocity, so that not a few of them have exhausted themselves as soon as they have broken the ribs: also, owing to the irregularity of their shapes, they are often unable even to pass through the broken bones. Thus, in wounds from shell-fragments, the lungs are hurt mostly by broken pieces of the bone itself, and accordingly, the wound orifice of the lungs and that of the chest wall do not correspond with each other. Hence the air will probably be hindered from escaping and thus we get a comparatively frequent occurrence of emphysema. Moreover, shell-fragments mostly strike the body at an oblique angle as will be seen in the foregoing 3 instances. This is surely another cause of obstructing the escape of air out of the chest. It is therefore not strange that emphysema should be of more frequent occurrence in the wounds caused by shell-fragments. Of the afore said 3 instances, one was, as has been mentioned, certainly attended with hæmoptysis, in another bloody expectorations began a few days after the injury. In the remaining case, we have no record of hæmoptysis, and can affirm that it did not actually occur, for so important a symptom could not have been left unrecorded if it had existed. Thus, in each of the 3 cases, the lung injury was certainly slight and superficial, and we thus infer that subcutaneous emphysema is more likely to ensue in slight injuries of the lungs.

Nos. 28 and 29 were cases in which though the shell fragment entered through the thoracic walls, it finally reached the abdominal cavity : in No. 28, the fragment entering the 9th intercostal space broke the 10th rib, then injuring the liver, arrived beneath the skin on the right side of the first two lumbar vertebræ. There existed no signs indicating lung injury, but it was beyond doubt that the liver was wounded, for from the wound orifice escaped a fluid mixed with bile pigments, and from time to time pieces of hepatic substance were discharged ; further, on probing the wound orifice it was found to communicate with the liver. However, severe paroxysmal pain in the right shoulder, which often attends hepatic injury did not occur, nor was there any jaundice or hiccough. The wound orifice at first seemed inclined to suppurate, but afterwards it made very favorable progress and was at last healed. No. 29 was a case in which the shell-fragment entering by the 8th rib in the left axillary line took a course obliquely downward, breaking the 10th rib. It was plain that the shell-fragment had fallen into the abdominal cavity, from the fact that intense pain was complained of in the abdomen on the following day, resulting in a serious peritonitis ; and from the presence of bloody expectorations, which shewed that the lung must have suffered more or less injury. What abdominal organs were injured, is not certain, but the intestines were certainly hurt, for there existed signs to the effect. This is therefore another instance of injury to abdominal organs, which did not result in instant death.

(2) Blind and penetrating wounds caused by iron pieces. These wounds numbered 12 occurring in 10 persons, of which cases of some interest are as follows :

1st example :—One of the fragments of a funnel broken by a shell, inflicted a lacerated wound 6 c.m. long and 2 c.m. wide, on the right side of the chest extending from the 7th to the 9th rib near the median line. It measured 2 c.m. in depth retaining an iron-piece at its bottom, which partially protruding beyond the wound orifice, was extracted by the injured person. The bottom of the wound reached the costal cartilage without injuring it, and the wound was healed in 4 weeks. (No. 140.)

2nd example :—From the same cause, a blind wound below the outer part of the right clavicle was received. The wound orifice was 2 c.m. in vertical diameter, 1.5 c.m. in lateral diameter and 6 c.m. in depth, the canal took an upward course, and an iron-piece was recognised wedged into the clavicle, which, being extracted, proved to be of an irregular square shape 2 c.m. long, 1 c.m. wide, and 3 m.m. thick. The clavicle was found only partially broken, not completely separated. The wound was healed in 9 weeks. (No. 189.)

3rd example :—At the same moment with the last, a blind wound was inflicted by an iron-piece, which extended from the left side of the nape to the base of the skull. By this the brain was injured, and the man died on the spot. (No. 60.)

4th example :—By a shell, both thighs were mutilated at the middle, and above the mutilated part of the right thigh another lacerated wound 5 c.m. long was sustained in which was retained a large fragment of a stanchion, 13 c.m. long and 7 c.m. in diameter. The man died after a short time from the shock. (No. 264.)

5th example :—Both legs were mutilated by a shell, and at the same time a large blind wound was inflicted on the thigh, in which 3 large fragments of the funnel casing were retained. The injured man expired in a short while. (No. 290.)

If 12 blind and penetrating wounds by iron pieces be proportioned to 60, the total number of various wounds occasioned by the same cause, they will bear a ratio of 20.00 per cent, which is not half so large as 41.67 per cent of the contused wounds, and is a little larger than 16.67 per cent of the abrased wounds. This is because as iron-pieces are not thrown about with much velocity, those which have a large bulk may indeed acquire force in consequence of their weight, but their size will prevent them from penetrating ; and those fragments which are small and capable of penetrating, lack weight and consequently force. Therefore, it is not often that any kind of iron-pieces penetrates the tissues. This is the reason why they frequently produce such injuries as contused wounds rather than penetrating ones. In the 1st example above mentioned, the wound orifice was as wide as if it had been produced by an iron-piece flying obliquely ; and the wound reached the costal cartilage without injuring it; and in the 2nd example the iron piece wedged itself into the clavicle without parting it completely. All these facts prove that iron-pieces are generally very weak in force. Besides, with the exception of the 3rd example of blind and penetrating wounds, there was not a case in which a bone was broken. This is because those fragments which penetrated into the tissues were small and wanting in force. However, with contused wounds caused by iron-pieces, there are many cases attended with fracture of bone. This is because some of them had a great weight and force owing to their size though their shape prevented them from penetrating into the tissues. The 3rd example lacks a minute record of the conditions of the wound orifice &c., so that we can not explain the case exactly, yet the iron-piece must have been exceptionally forceful as the base of the skull was smashed, and as the injured person was then close by the funnel, of which the piece was a fragment: also the shape of the fragment probably had much to do with its deep penetration. The 4th example was a very interesting one,—a lacerated wound 5 c.m. long in the upper part of the right thigh, within which was retained a large fragment of the stanchion 13 c.m. long 7 c.m. in diameter (see the illustration in the clinical history). The entrance orifice of the blind wound produced by an iron-piece should usually be smaller than the piece itself, as in the case of the orifices made by shell-fragments, whenever it strikes at right angles a part rich in soft tissues ; and if the velocity of the iron-piece is weaker than that of a shell-fragment, this will be more particularly the case. The 4th example proves this more than sufficiently, for the iron-piece was so large compared with the size of the wound orifice, that it was hard to conjecture how it could have entered through such a hole. Whether the iron-piece struck the skin with its long axis, or otherwise is not known, yet at any rate its size compared with the hole is incomparably large. This was probably because it had greatly stretched the skin by pressure before penetrating it, otherwise the hole could not have been so comparatively small. And so remarkable an extension of skin should not be attributed only to the size and weight of the said iron-fragment, but it must also have borne some relation to the reception of a mutilated wound in the neighborhood. For, the part just below the present wound had been entirely mutilated by a shell, and as the velocity of a shell should be greater than that of an iron piece, so the mutilated wound must have been inflicted previously to the present injury, be it ever so little earlier. Therefore, at the time when the iron-piece struck the skin, the latter was certainly capable of being stretched by pressure, owing to the free movement of the tissues which had been freed from connection below, and besides, the relaxation of the muscles produced by the very severe shock which inevitably follows a mutilated wound, may also have had something to do with this phenomenon. The several reasons above mentioned, will perhaps account for so great a difference between the size of the wound orifice and of the iron-piece. The 5th example which bore a resemblance to the last case, was one in which both legs were mutilated by a shell, and in the right thigh were concealed 3 large pieces of the funnel casing as are shown in the illustration in the clinical history. The orifice of this wound was also smaller than that of the iron-pieces ; however, its exact length was not known, for the difference not being so marked as in the 4th example, thed imension of the wound was not measured. This and the last wounds were inflicted by the same cause, but as the weight of the iron-piece was much smaller than in the 4th example, it naturally stretched the skin in a lesser degree. Besides, in this case, though the mutilated wound was in the leg, the resistance of the subcutaneous tissues was not so much lessened as in the last example, and thus the difference between the sizes of the orifice and of the iron-piece was not so great as in the 4th example. The division of the piece of iron into three must have taken place after the iron entered the wound. Besides, there were one or two blind wounds produced in parts rich in soft tissues, but with them, the difference between the size of the wound orifice, and that of the iron-piece was not so marked, for as the fragments entered the tissues in a slanting direction their sizes were almost the same.

(3) Blind wounds caused by wooden splinters. These numbered

5 occurring in 5 persons, except those mentioned below, the rest were punctured wounds by small wooden splinters.

1st example :—A hostile shell glanced off and broke the deck from side to side, when the person happened to be in the neighborhood. Such exposed parts of the body as the face, neck, and hands received numberless fine wooden splinters, so that the skin presented the appearance of a hedgehog ; and at the same moment several large and small contused wounds were inflicted by iron and wooden pieces on the face, neck and limbs. All of them were however, completely healed in two weeks. (No. 98.)

2nd example :—A 30.5 c.m. shell exploded in the next room, and a big wooden splinter came flying wedged into the left sacro-iliac joint. The wound orifice was 5 c.m. long and 3 c.m. wide ; the margins were very irregularly lacerated ; and the wooden piece at the bottom being firmly wedged into the joint could not be moved when the surgeons tried to take it out. After a time, both legs became paralyzed, and urine passed unconsciously mixed with blood and pus. After admission to the hospital, an attempt was twice made to extract the wooden piece, but being extremly firm, it was only partially pulled out, and with it came broken pieces of the bone. The paralysis of the legs increased, urine and fæces passed involuntarily, and the wound suppurated, the temperature fluctuating between 38° and 39° C. The patient died after 2 weeks from exhaustion. (No. 167.)

If the 5 blind wounds caused by wooden splinters be proportioned to 58, the total number of various wounds from the same cause, they bear the ratio of 8.62 per cent, which is much smaller than 39.66 per cent of the contused wounds from wooden splinters, 22.41 of the abrased wounds from the same cause and 29.31 of the contusions also from the same cause. This is because the scattered wooden splinters lacking in weight and force have not power enough to penetrate into the tissues. The exceptional cases were those in which very fine wooden splinters like tooth-picks stuck into the skin. The 1st example above mentioned was no more than one of those cases, it was however remarkable on account of the wonderfully numerous punctured wounds on exposed parts as the face, neck, and hands. The 2nd example is an extremely rare case in which a large wooden splinter firmly wedged itself into the left sacro-iliac joint, breaking the bones and probably injuring the cauda equina, followed by the complete paraplegia of both lower limbs and paralysis of the bladder and rectum. As this wooden piece was very firmly in, several forcible attempts to pull it out were made, but in vain, only a broken part of it being removed. The size of the wooden splinter was not ascertained, yet it seems to have been some 5 or 6 c.m. in diameter, and being so firmly wedged into the joint, it is certain that it was not weak in force. Wooden pieces are it is true, generally weak in force ; but they differ in weight and consequently have not the same force as shells ; so when a splinter is pointed at one end and consequently fit for penetration, this kind of wound may be expected.

(4) Blind wounds : uncertain whether caused by shell-fragments or by iron-pieces. These are 3 in all occurring in 3 persons, as is shown below.

1st example :—A shell burst, striking the iron-pillar on the deck : broken fragments of the shell and the pillar scattered, and inflicted following wounds : first, a blind wound on the left side of the chest, breaking the 5th and 6th ribs on the axillary line, accompanied with heavy hæmorrhage. But the lung seemed not to have been injured as there was no hæmoptysis. What was the size of the fragment could not be known as its location was not ascertained. Secondly, in the calf of the left leg and on the outer side of the left ankle joint there were blind wounds in which iron-fragments were retained. The temperature rose to 38° C. and blood accumulating in the left pleural cavity, signs indicating increased pressure in the chest supervened, and the patient died next morning. (No. 143.)

2nd example :—A shell burst against the gun-support, and the fragments of the shell and of the broken iron inflicted a penetrating wound on the left side of the forehead. Also the upper part of the right thigh was mutilated and the injured man died on the spot. (No. 65.)

3rd example :—This is the case of the blind wound of the left leg mentioned in the 18th example of blind wounds caused by shell fragments; it could not be ascertained whether the foreign body extracted from the wound was a shell-fragment or an iron-piece.

The blind wounds of uncertain cause whether by shell-fragments or iron-pieces are the three above mentioned. As regards the 1st example, the wounds in the calf of the left leg, and on the outer-side of the left ankle joint it is sure, were caused by iron-pieces, but the cause of that on the left side of the chest was not certain. In the latter wound, the 5th and 6th ribs being broken hæmorrhage was profuse, but inferring from the fact that there were no signs of lung-injury, or of the entrance of a foreign body into the thoracic cavity, and that two ribs were broken indicating the causative object not to have been small, we should think that in the present wound, as in the 11th example of the blind wounds caused by shell fragments, the causative missile did not penetrate entirely, but in part, that it broke the ribs, and fell off of its own accord. Though in the clinical history of this case the size of the wound orifice was not stated, we are told that it was a wide lacerated one, which fact evinces that the wound was not inflicted by a small fragment falling down in a slanting direction. The death on the following day seems to have been occasioned by internal hæmorrhage, which we shall further discuss in the next chapter. As for the 2nd example, the mutilated wound of the upper part of the right thigh was certainly produced by a shell-fragment, but with the injury in the forehead it is not known, which of these two objects, a fragment of shell or iron metal, was the cause. If the object be ascertained to have entered the skull, we should say judging from its force, that it was a shell-fragment, but whether it did actually penetrate or not is likewise doubtful. The instant death of the injured person was natural, as both the wounds were very serious. The 3rd example has been already discussed among the wounds by shell-fragments.

(5) There is one case of blind wound produced by buck-wheat husks :—

An enormous shell burst on the lower deck and the explosion gas, shell-fragments and other kinds of broken pieces welled up out of the sky-light, when an irregular round blind wound 3 c.m. in diameter was inflicted on the back of the middle of the right forearm. The wound was 3 c.m. deep retaining foreign bodies at the bottom, which, being taken out proved to be 6 or 7 buck-wheat husks. The wound was healed in 7 weeks. (No. 221.)

From the existence of buck-wheat husks in the wound, they were regarded as the cause of the injury, but the wound aperture which was an irregular round one 3 c.m. both in diameter and depth could not have been produced merely by buck-wheat husks. The husks which had been used as the stuffing of a pillow can not be regarded as having produced a single hole of such a size, even had they been driven in a large mass. Therefore, we should say that the husks entered the tissues sticking to a shell-fragment, or an iron-piece and were left behind, while the main object came off owing to its partial penetration into the tissues.

(6) There was one case produced by a bullet, but whether it was from a musket or Gatling gun was not known. The wound was a small blind wound merely piercing the skin.

The blind and penetrating wounds numbered 79 in all as stated before, of which 57 were caused by shell-fragments, 12 by iron-pieces, 5 by wooden splinters, 3 uncertain, whether by shell-fragments or by iron-pieces, and 2 of which one was by a bullet and the other probably by buck-wheat husks. Proportioned to 629 the total number of various wounds, they bear a ratio of 12.56 per cent, which indeed is by far smaller than the ratio of contused wounds, but occupies the highest number among all other kinds of wounds. This is the point which shows the difference between the nature of shell wounds and bullet wounds. The bullets on account of their velocity and shape were suited for penetration, thus they generally produced perforating wounds, while shell-fragments as well as iron or wooden pieces have an irregular shape and are not forcible enough to pierce through an object, and therefore those which are heavy, and accordingly possess much force produce mutilated wounds, those which rank next in bulk, and are not so forcible in power cause mostly contused wounds or contusions, and those which are small in bulk, and more or less strong in velocity, or those which are pointed at the end, and are suited for piercing, can only enter into tissues, yet owing to insufficiency of force and unfavorable shape, mostly stop when they meet with tissues offering much resistance ; hence the result is a blind or penetrating wound. Therefore, such wounds as perforating ones are of very rare occurrence. However, the contused, blind and perforating wounds do not depend for their production only on the velocity, size, and shape of the projectiles, but also on the conditions of the part struck. In parts rich in soft tissues, as the thigh, and parts covering soft internal organs, as the abdominal walls, which are easily penetrated, even those missiles which produce contused wounds elsewhere may often cause blind or penetrating wounds. That there were nine cases of penetrating wounds in hard parts like the head, may appear at first sight incompatible with the above statement ; however, not only can these 9 cases not be certainly described as penetrating wounds, but they were all inflicted in the proximity of shell-explosions so the fragments, even though small, may be regarded as not having been weak in force, and it is nothing abnormal that they should have all been penetrating wounds. Again, in the clinical history there were several cases stated as blind wounds where the wound was very deep but no record was given of the existence of shell-fragments. In these cases, it could not be ascertained whether the wounds were healed with the fragments remaining, or whether the wounds merely resembled blind ones, but were actually contused or lacerated wounds. As we have already said, there are cases in which the missiles striking a part poor in subcutaneous tissues, penetrated a little distance and stopped there, and then came off of their own accord, but cases of deep wounds with no shell-fragments in them can not be regarded as true blind wounds.

5.—PERFORATED WOUNDS.

(1) There is one case of perforated wounds caused by an entire shell, as is seen in the man killed on the fore-top of the Akagi. According to the report made by the Chief Surgeon of the ship, he was pierced through the abdomen from the loins, the lumbar vertebræ were smashed and the aorta ruptured (case No. 171), possibly by a shell from a light-machine gun of some 47 m.m. But another person who was injured at the same place and time (No. 235) seems to have been struck by a fragment of a shell, as was seen from the powder grains sticking in dots around the wound of the hand. This is a point admitting of doubt, for on the one hand unless a shell exploded in the neighborhood, such intrusion of powder grains would not have occurred ; but on the other, allowing that such explosion happened, it is strange that the margin of the wound in the hand was the only place covered with powder grains which ought to have been scattered more widely, so as to involve the face and other exposed parts, or to inflict burns there. The only explanation that can be offered is that

all the other parts of his body were protected, the hand alone was exposed on the side from which the explosion gas came. Seeing that there also existed abrased wounds on several parts, we can venture to say that the person was struck by the fragments of a shell that burst in the neighborhood, and that the wounds on the parts covered with clothes, were probably caused by the shell-fragments rebounding from some other objects. We may therefore reasonably assume that the perforating wound of the abdomen was probably inflicted by a large fragment of the shell. The report that it was produced by a shell about 47 m. m. is no more than a mere conjecture based upon the size of the wound aperture.

(2) The perforated wounds produced by shell-fragments numbered 33 in all, occurring in 30 persons, of those having some interest will be briefly described below.

1st instance :—A perforated wound in the ball of the thumb had on the palm a round entrance aperture some 2 c. m. in diameter, which running along the radial side of the 2nd metacarpal bone found exit on the back of the hand. The exit was somewhat large presenting a lacerated appearance. Besides this, there were burns on both forearms. (No. 227.)

2nd instance :—A large perforated wound on the right leg; that is, at the upper part of the inner side of the leg, was a large irregular oval entrance aperture 15 c.m. in length, which found its exit in a star-like shape 7 c.m, long and 4 c.m. wide on the back of the middle of the same leg (See the illustration in the clinical history). After a time, the healing process was gradual, and completed in 5 months, but owing to the cicatrix, the circulation of blood was somewhat obstructed so that the foot was inclined to swell, but friction and local bathing were resorted to, and the patient completely recovered, and returned to duty. (No. 282.)

3rd instance—Perforated wound on the right side of the chest breaking the 4th rib and found exit on the back causing a heavy hæmorrhage. In addition, the man sustained burns on the head and face, and he died on the spot. The size of the wound aperture was not known. (No. 148.)

4th instance :—A large perforated wound from the left side of the chest to the right side of the back was sustained, accompanied with another perforating wound from the inner side to the back of the middle of the left thigh, and burns on the face and neck. He was killed on the spot. The sizes of the perforating wounds were not recorded. (No. 151.)

5th instance :—A perforating wound at the upper third of the right thigh, the femur was broken and the hæmorrage profuse. The entrance orifice was an irregular square shape 3 c.m. in diameter, and the exit a lacerated form hardly 3 c.m. in diameter. Besides, there was a contused lacerated wound 4 c.m. in length on the right shoulder. He died on the spot. (No. 260.)

6th instance :—A large perforating wound from the right side of the chest to the back was inflicted, accompanied with a similar wound in the middle of the left upper arm. The injured man died on the spot. The size of the wound was not recorded. (No. 149.)

7th instance :—A perforating wound from the right side of the thyroid cartilage to the nape of the neck corresponding to the second cervical vertebra was sustained, and it seemed, as if the right eye-ball had been hit by a small shell-fragment, the cornea and sclerotic were destroyed discharging the contents of the eye. Though the carotid artery was not injured, hæmorrhage was profuse, at first the mind was firm without signs of shock, but after a time the temperature rose accompanied with nausea and vomiting, and the patient became drowsy, finally falling into coma, he expired in little more than an hour after the injury. (No. 128.)

8th instance :—A perforating wound from the outer part of the right clavicular region to the right shoulder was sustained, accompanied with a blind wound in the front of the right thigh, and three abrased wounds on the inner side of the left leg. The entrance orifice of the wound of the clavicle had an oval shape the size of the tip of the thumb, the exit was smaller and presented a lacerated form ; the outer part of the clavicle was broken. In the wound 5 pieces of bone were found and extracted. The wound healed in 3 months, but the muscles became emaciated, the grasping power was greatly weakened and treatment being of no avail, the patient had finally to be invalided. (No. 193.)

9th instanee :—A large perforating wound from the right side of the chest, to the left part of the back was sustained, breaking the 3rd rib. The injured man died on the spot. The size of the wound aperture was not recorded. (No. 147.)

10th instance :—Perforating wound of the upper arms, penetrating wound on the left side of the chest, blind wound on the back, and several contused wounds on the back and thighs were sustained. The perforating wound of the right arm pierced through it at the middle from back to front, breaking the bone. The entrance orifice had a lacerated form about 2.5 c.m. in length, and the exit had the same shape and size. The left arm was perforated in its lower third, passing from the posterior surface to anterior; both the entrance and exit wounds had lacerated forms though somewhat smaller than the one on the right arm. In both cases, the humerus was broken, and the orifices in front of the bone had their soft tissues extensively severed, and many small pieces of the bone were found sticking in the muscles. The brachial artery was intact in each case. Afterwards both wounds fell into suppuration, and frequently discharged minute particles of the bone together with pus. On the right arm, paralysis of the musculo-spiral nerve ensued. After the lapse of 6 months, the wound of the left arm was healed, followed by that of the right. However, the paralysis of the musculo-spiral nerve remained as before, and the muscles supplied by it wasted, so that the grasping power was entirely lost. Tnere was no hope of recovery, accordingly the patient was discharged after 15 months in the hospital. (No. 209.)

11th instance :—A large perforating wound from the left side of the chest to the right side of the abdominal walls was sustained. The injured man was killed on the spot. The size of the wound orifices was not recorded. (No. 145.)

12th instance :—A large perforating wound from the lumbar region to the abdomen was sustained; the lumbar vertebræ were smashed. Besides, a large contused wound with fracture at the middle of the right thigh was received, the person was killed then and there. (No. 174.)

13th instance :—At the lower part of the right forearm was sustained a mutilated wound, and while the patient was receiving treatment in the surgery, an enormous shell burst in the room, inflicting a large perforating wound on the right thigh. The length of the entrance orifice measured 13 c.m. and the width 8 c.m. The exit was of about the same dimensions, but a little smaller than the entrance orifice. The margins of the wound were irregularly lacerated; the soft tissues inside it were extensively severed, the fascia rent in various lengths, and the femur being smashed below the great trochanter, numerous pieces of the bone were found in the severed muscles. Afterwards, the skin and other tissues around the wounds sloughed, and pus accumulated beneath the periosteum of the femur. The temperature rose, and symptoms of traumatic delirium began. Amputation at the upper part of the thigh was performed ten days after the admission, but the patient died soon after the operation. (No. 261.)

14th instance :—A perforating wound from the hypogastric region to the loins. The injured man was killed on the spot. The size of the wound orifice was not recorded. (No. 169.)

15th instance :—At the same moment with the above, a perforating wound in the hypogastric region. The injured man was killed on the spot. The size of the wound orifice was not recorded. (No. 170.)

16th instance :—A perforating wound on the back of the left hand, from the ulnar side of the 1st metacarpal bone, smashing the 2nd, 3rd, and 4th metacarpal bones with exit on the radical side of the 5th metacarpal bone. The entrance orifice had an irregular star-like form 3 c.m. in diameter, and the exit a lacerated form about 3 c.m. in length. Hæmorrhage was profuse though not continuous. Contused wounds were also sustained on the back of the head and left buttock. The wound of the hand suppurated, and as the bones were irregularly broken, those which were heavily damaged were resected, and others not so much severed were sawn off at the broken ends, the unhealthy granulation in the wound being scraped away. Thus, in 80 days after the injury, the wound was healed; but owing to the loss of the metacarpal bones, the man was dismissed. (No. 228.)

17th instance :—A perforating wound was received on the inner side in the upper third of the right thigh. The entrance orifice had an irregular round form, 12 c.m. in diameter, and the exit which was situated behind the former had an irregular square form 4.5 c.m. in length. The muscles and other tissues protruded, and the margins were irregularly lacerated; hæmorrhage was not heavy. Besides, there was an abrased wound on the abdomen. The wound of the thigh suppurated, and the tissues around the margin of the wound sloughed. The patient recovered after five months in the hospital. (No. 256.)

18th instance :—There existed a grooved wound, 18 c.m. in length, 3 c.m. wide, and 1.5 c.m. in depth, running transversely on the back. The one end of the wound passed under the skin for about 3 c.m, making an exit below the acromion process of the left scapula. The exit had an irregular round shape 5 c.m. in diameter, the margins being unevenly lacerated. The bottom of the grooved wound corresponding to the entrance orifice was sharply cut and bled profusely. There was no injury to the scapula, vertebræ nor ribs. The wound was completely healed in 4 months. (No. 142.)

19th instance :—A perforating wound was received in the lumbar region. The lumbar vertebræ were broken, and several small blind wounds were sustained on the back. The person was killed on the spot. The size of the wound orifice was not recorded. (No. 172.)

20th instance :—A perforating wound passing from the occipital region to the middle of the forehead was sustained. The injured man was killed on the spot. The size of the wound was not recorded. (No. 67.)

21st instance :—A perforating wound was received in the uppermost part of the upper arm. The entrance hole was situated in the anterior surface of the arm and constituted a wound with loss of substance in an oval shape 5 c.m. in diameter ; the margins were greatly lacerated including the deltoid muscle, and the wound passage found its exit on the posterior surface. The exit had a lacerated form being somewhat narrower than the entrance hole, and the severed fibers of the muscle were seen protruding out of it. Also, below the lower margin of the left orbit was sustained a blind wound 1 c.m. in diameter, which caused hæmorrhage in the retina. All the wounds were healed in 3 months after admission to the hospital, but owing to the loss of sight of the left eye, the man was dismissed from the service. (No. 103.)

22nd instance :—A perforating wound was inflicted above the left elbow. The entrance hole was an irregular wound with loss of substance measuring 6 c.m. long, and 4.6 c.m. wide, and the exit was a lacerated wound 2.7 c.m. long. This occurred together with the penetrating wound of the abdominal cavity from the left side of the chest. (See No. 20th instance of penetrating wounds.) From this penetrating wound, the man died 10 days after. Though we can not assert with certainty, yet from the position and size of the wounds in the elbow and chest, they may be regarded to have been caused by one shell-fragment. (No. 162.)

23rd instance :—A perforating wound was received passing from the back of the left ilium to the right inguinal region. The entrance hole was lacerated and about 6 c.m. in long diameter. The ilium was greatly damaged and the internal organs were injured, the exit was found above the Poupart's ligament: it was a hole some 8 c.m. in length from which the intestines protruded. In the abdomen, several fragments of the bone were found the largest of which was a broken piece of the iliac-crest, 9 c.m.

in length. The patient was firm in mind, without any sign of shock, but incessantly complained of severe pain in the abdomen, rolling about and sweating profusely. In spite of the desire to pass urine, it was impossible. On introducing a catheter, only blood was drawn, indicating that the bladder was also injured. The patient died in 8 hours after the injury. (No. 173.)

24th instance :—While standing on the bridge, the person received a perforating wound in the abdomen, and fell overboard being killed on the spot. (No. 168.)

25th instance :—A perforating wound was inflicted on the lower third of the right thigh. The entrance hole had an irregular triangular shape, 3.6 c.m. at the base and 2 c.m. at each border, and the exit presented a small laceration as is seen in the illustration of the clinical history in which a part of the shell-fragment was shown to protrude. Within the wound two shell-fragments (shown in the illustration of the clinical history) were found. The wound was healed after a lapse of 3 months. (No. 257.)

26th instance :—Two persons received perforating wounds of the chest at the fort of Lutsotsai from which they died on the spot. The size of the wounds was not recorded. (No. 146 and 151.)

The perforating wounds caused by shell-fragments numbered 33, which proportioned to 289, the total number of various wounds produced by the same cause, bears only a ratio of 11.42 per cent, which is smaller than 33.56 of contused wounds, 19.72 of blind wounds, and 16.26 of abrased wounds. This is because as has already been explained the shell-fragments which are the chief cause of the gunshot wounds have an irregular shape and coarse surface and are not only unfit for penetration, but have a great variety of sizes. The large and consequently powerful ones frequently produce mutilated wounds, as they are unfit for piercing, while the weaker ones cause contused wounds, contusions, or abrased wounds. Thus it is very rare that perforating wounds are produced by large fragments of shell, the small fragments may well enter tissues, but owing to lack of force, mostly produce blind wounds and very rarely perforating ones.

Therefore, those which produce the perforating wounds are mostly of middle size ; on considering the examples before mentioned, we see that the wound with the smallest orifice was the size of the tip of the thumb, while wounds with large orifices are seen in the 2nd, 13th, 17th, and 18th instances. Again, shell-fragments, for the same reason which makes them unfit for penetrating into tissues, receive much resistance from the air while flying through it, and in consequence remarkably soon lose their original velocity after flying a short distance. This they do even sooner than the shells themselves, to say nothing of bullets. The relation that velocity bears to force is very great, for if a unit of velocity be multiplied by two, the force increases to 4, and if by 3, the force will increase to 9, so a shell-fragment which has enormous force at the point of explosion will lose its force remarkably at a short distance. For this reason, the kinds of wounds inflicted, greatly depend on the distance of injured persons from the place of explosion. If the shell burst near the man, either mutilating, lacerated, or perforating wounds will be produced, but if the explosion occurred at a short distance from the man, other kinds of wounds will be produced. Hence the cause of the rareness of perforating wounds may easily be seen. Now, the perforating wounds produced in the late war were chiefly caused by shell-fragments and numbered 33 out of a total of 38 wounds, that is, 86.84 per cent of all perforating wounds, and the remaining 5 were inflicted by the following causes ; one by a shell itself, one by a bullet and the other three by iron-pieces. There is some suspicion that a wound ascribed to a shell itself as we have already said may have been produced by a shell-fragment, and one of the three cases ascribed to iron pieces may have been caused by a shell-fragment too. If so considered the ratio will be 92.11 per cent. It is a natural result that iron-pieces produced only 2 or 3 wounds and wooden-splinters none at all owing to the weakness of force.

In perforating wounds, the entrance hole is, as a rule, larger than the exit. This can be proved in Nos. 2, 5, 8, 16, 17, 21, 22, and 25 instances before mentioned. The entrance hole is larger than the exit, but as was already said, shell-fragments are unfit for penetration owing to their irregular shape and to the lack of velocity, and when they enter such places as the abdomen or thigh, the skin is not broken until it has been stretched to the utmost extent as is the case in producing a blind wound, and for this very same reason, the orifices of the penetrating wounds may be more or less smaller than the shell-fragments themselves, in proportion to the degree of the yielding of the skin. However this can not be proved by fact, for there was no case of penetrating wound in which the shell-fragment was obtained so as to enable us to investigate the relation between the size of the wound orifice and that of the shell fragment. Indeed, in the 25th instance where the fragment remained in the skin, its size was ascertained, but as will be referred to later on, it was of no use for proving the fact concerned because there existed two shell-fragments which prevented us from identifying the one as the chief cause. The 22nd instance is, as will be related later on, the only case of more or less interest. At the moment of formation of the exit in the penetrating wound, as the shell fragment is already weakened in its force by piercing through the tissues, and the skin has nothing to support outside, it can greatly be stretched, the resulting orifice is not only remarkably small, but mostly presents a simple fissure. The 2nd, 17th, and 22nd instances are those in which the entrance and exit holes have a great difference in size; and the entrance hole of the 2nd instance was no less than 15 c.m. in diameter, and that of the 17th 12 c.m. in length, was of course owing to the fact that the fragments were not small, but also in a certain degree to the fact that they flew down in a slanting direction. Though the exits were strikingly small compared with the entrance orifices, they had an irregular square or a star-like shape, and not a lacerated form. This was because the skin could not escape from losing substance in spite of its extension, as the shell-fragments were not small. On the contrary, there were cases in which both the entrance and exit holes presented a lacerated form, as is seen in the 10th and 23rd instances: this probably because the shell-fragment struck the part with their narrowest surface. If a shell-fragment is weak in force, it greatly depresses the skin producing a lacerated entrance hole, but the fragments in the said two instances certainly were not weak seeing that the bones were broken. Also, there were cases in which both entrance and exit holes had almost the same size and shape as is seen in the 10th and 13th instances. This was perhaps because in both cases the bone having been broken, the shell-fragments must have been driven out in a mass with the bony pieces as well as the severed soft tissues, so that the exit holes were made as large as the entrance ones. Indeed, in cases of perforating wounds attended with fracture of bone, it is no wonder that the exit holes sometimes are larger than the entrance one, as it is a well known fact with the perforating wounds made by bullets involving the bone. This is exemplified in the 23rd instance in which the exit hole was larger than the entrance, probably owing to the fact that the broken pieces of the bone were driven out in a mass with the shell-fragment. But the 1st instance of the perforating wound is an exception to all reasons suggested: the wound was reported to have had an entrance hole 2 c.m. in diameter and an exit hole somewhat larger and of a lacerated form ; and as it did not injure the bone passing from the ball of thumb to the back of the hand, the size of the exit hole should have been smaller than that of the entrance hole ; but strangely enough it was somewhat larger. If the report was not erroneous, there is no other explanation, than to assume that the shell-fragment after entering the tissues, changed its flying axis and broke the skin at the exit with a larger surface than when it entered, or the shell-fragment was one with very strong force. When a conical bullet having a greater velocity produces a perforating wound, the entrance hole is generally round and somewhat smaller in its diameter than that of the bullet, and the exit hole presenting a lacerated fissure is a little longer than the entrance hole, just as was seen in the entrance and exit holes of the 1st instance. Therefore, it is not strange that the same result should be produced by a shell-fragment having a great velocity. Only it is very rare that a shell-fragment has so great a velocity.

In the 18th instance the inlet measured 18 c.m. long, 3 c.m. wide, and 1.5 c.m. deep, and the exit was of an irregular round form 5 c.m. in diameter. The existance of a long inlet resembled the 11th instance of penetrating wounds, where the shell-fragment must have struck the part parallel with its course, and so first produced a grooved wound ; but the large size of the exit without injury to the scapula seems rather anomalous, and it makes us suspect that it may not have been the exit but the inlet. However, as will be seen from the blind wound received on the neck at the same moment, the shell-fragment of which came from the right side, it is certain that the man must have stood where he could receive the shell-fragment from this direction. The problem is still more inexplicable if we assume the above mentioned grooved wound to have been the exit, for a shell-fragment passing beneath the skin in a parallel line, would be almost certainly unable to pierce it in such a manner as to produce a long grooved wound at its exit. But how are we to account for the exit being so large ?

Partly because the shell-fragment was not a small one, and yet it was certainly not very large seeing that it did not injure the bone. There is, therefore, no alternative explanation except that the fragment, which was not weak in force, struck the sloping surface below the acromion process, and made its exit in a slanting line producing a comparatively large hole, as is usual with a blind or perforated wound caused by an oblique shell-fragment. There have been cases of perforated wounds with fracture where the exits are smaller than the inlets as in the 8th and 16th instances. This phenomenon is not strange, if we consider that the fractured pieces of bone did not come out in a mass with the shell-fragment. Again, No. 22 was a case in which the left elbow joint was perforated from the outer to the inner side, and at the same time the left side of the chest in the 8th rib sustained a penetrating wound. Whether these two wounds were caused by one and the same shell-fragment can not be ascertained ; but assuming that the arm was hanging at that moment over the side of the chest in its natural position, we may infer that a single fragment was the cause of both injuries from the correspoding situations of the wounds. If this was the fact, the case is a good instance for showing that the force of the shell-fragment differs when it produces a perforated wound and a penetrating one, and that such difference of force involves a corresponding difference in the sizes of the inlets. The first perforated wound had an inlet of an irregular oval shape 6 c.m. long, 4.6 c.m. wide, and a lacerated exit of 2.7 c.m , while the second penetrating wound had a gaping inlet of 3 c.m. in length attended with loss of substance. The large size of the first inlet had doubtless some connection with the fact that the shell-fragment pierced the skin obliquely, at a falling angle, but seeing that both the exit of the first wound and the inlet of the second wound held the same angle with the inlet of the first, the difference between the sizes of the first and second inlets must be mainly attributed to the difference of striking powers. When the first inlet was made, the shell fragment had too much force to give the skin time to yield, accordingly a large hole was produced ; but when the exit was formed, not only was the force weakened, but, in addition, owing to the difficulty of finding a way out by breaking non-resistant skin obliquely, it allowed the skin to extend so as to produce a comparatively small hole ; again, when the inlet on the chest-wall was made, the force was still further lessened and the skin stretched downwards and inwards at the 8th rib, till it broke at the 10th rib. The inlet was therefore much smaller than that at the elbow, though much larger than the exit, but this was probably because when the wounds were made there was a difference in the tension of the skin. The 25th instance was a case half-way between a perforated and a blind wound. In this case, though the shell-fragment thrust its point out through the skin, it could not entirely come out owing to entire loss of force. An object weak in force can not break the skin from within, for the latter offers an elastic resistance—that is, the skin has a remarkable yielding power which it is not easy for a weakened projectile to perforate. As it often happens with blind wounds that shell-fragments stop under the skin, so there is no wonder that a spent fragment should remain after merely breaking the skin. The only thing strange in the present case is, that there were two shell-fragments in the exit wound. These two fragments were at first thought to have been originally a single one, which being already partly cracked split into two on encountering the resistance of the tissues, when it penetrated the body. However, these pieces, when examined, were found not to coincide on any surface, so they must be regarded as distinct pieces which strangely enough struck one and the same spot and made a single wound.

The perforated wounds of the chest are the Nos. 3, 4, 6, 11 and 26, occurring in 6 persons, each of whom was killed on the spot. The sizes of these wounds have not been ascertained, but considering that as a rule a small shell-fragment can rarely inflict a perforated wound, we shall be able to imagine what the sizes were. According to the experiences of former days when bullets of a larger calibre were used, perforated wounds of the chest, almost always terminated in death. It was therefore quite to be expected that the present six cases should all have resulted in instant death.

The perforated wounds of the abdomen are six in number as shown in the 12th, 14th, 15th, 19th, 23rd and 24th instances, all of which, except the 23rd, resulted in death. Two of them were cases in which the lumber vertebræ were crushed, and in another the injured man was thrown overboard. The 23rd case died 8 hours after injury. Thus it will be seen that perforated wounds of the abodomen have a very unfavorable prognosis. As already discussed under the heading of penetrating wounds, the abdomen is a part liable to penetrating wounds from large shell-fragments, leaving a comparatively small wound aperture. The sizes of the perforated wounds were mentioned only in instance No. 23, but it can easily be seen that the shell fragments producing them were not small ; for a shell-fragment which produces a perforating wound is naturally stronger in force than that inflicting a penetrating one. Thus, in the case when a shell-fragment, not small, and having an irregular and rugged shape penetrates the abdominal cavity, not only are the visceræ injured, but the vessels and nerves are also liable to lesion, and consequently instant death is the natural result in most cases, owing to a severe shock or internal hæmorrhage. The prognosis is incomparably more unfavorable than that of bullet wounds. Cases like No. 23 which in spite of the serious wound, the injured man escaped instant death, without exhibiting any symptoms of shock, are to be looked upon as anomalous. This certainly depended on the circumstances of the visceral lesion, the direction of the shell-fragment; and also on the constitution of the injured man. Thus, it is hardly necessary to say that the result is not always the same in all cases.

The only case of perforating wound of the head is the 20th instance, in which instant death was quite natural. The wounds of the head by shell-fragments, mostly take the form of mutilated wounds by the destruction of a part of the skull, or else of contused lacerated wounds attended with fracture, or of penetrating wounds ; and it is very rare that a perforating wound is produced like in the present case. This was because the shape of the shell-fragment was not adapted for perforation.

The 7th instance was a perforating wound of the neck resulting in death an hour after the injury. In this case, it is recorded that the carotid artery was not hurt, but neither the size of the wound nor the injury of the cervical vertebræ was recorded, hence we cannot affirm anything exactly, yet the rise of temperature after injury is very curious. It may have been due to a lesion in the upper part of the spinal cord.

The 10th example was a case in which after the cure of a perforating wound with fracture in the right arm, an incurable paralysis of the musculo-spiral nerve was left. From the position of the wound which perforated the middle of the upper arm from back to front, it is probable that the nerve was injured at the same moment with the humerus, but perhaps, as the arm was kept with a splint, symptoms of nerve injury did not appear until some time after. We shall discuss this case more fully hereafter.

(3) There were three perforating wounds caused by iron-pieces occurring in 3 persons, as follows:

1st instance :—A perforating wound of the soft tissues in the upper part of the left forearm, together with an abrased wound on the left leg, and burns on the face. The patient recovered in about 80 days. (No. 222.)

2nd instance :—A perforating wound extending from the lower part of the spine of right scapula to the upper part of the right arm. The entrance wound at the scapular region presented a curved lacerated form, and the exit hole on the upper arm was a vertically lacerated wound 4.5 c.m. in length with everted margins out of which the muscular substance protruded in a crater-like form. The scapula and the surgical neck of the humerus were broken. When the patient was admitted to the hospital, both the entrance and exit holes being enlarged, several pieces of the bone were extracted. But at the time, the wound had already fallen into suppuration, and sloughs had been formed at the margin so that the development of granulation was unfavorable. The case lingered on for about five months when erysipelas set in, and the patient succumbed. (No. 192.)

3rd instance :—A perforating wound in the soft tissues of the right leg was received. The entrance orifice measured 5.5 c.m. in length and 4.5 c.m. in width, and the exit hole 3 c.m. in length and 2.5 c.m. in width. Though the bones, vessels, and nerves were not injured, the tissues around the wound were strikingly lacerated, consequently they sloughed and the wound was at last cured in three months. (No. 283.)

There were only three perforating wounds caused by iron-pieces as above mentioned. This proportion to 60, the total number of wounds from the same cause, bears a ratio not larger than 5.00 per cent, which is the smallest percentage of all, for the contused wounds cover 41.67 per cent, the blind wounds 20.00, the abrased wounds 16.67, contusions and mutilated wounds respectively 8.33. This shows that iron-pieces, as already stated, are too weak to easily produce perforating wounds. Though iron-pieces are almost the same with shell-fragments in shape and weight, yet as the former are imparted with by far, the less velocity, they are consequently much weaker in force. At the time of battle, shell-fragments are scattered about in a ship in a larger number and reach a further distance than iron-pieces ;

and naturally all kinds of wounds are caused more frequently by shell-fragments, especially this difference is markedly great in the case of perforating wounds ; for of all the wounds caused by shell-fragments, the perforating wounds have 11.45 per cent, while of all the wounds by iron-pieces the perforating wounds only cover 5.00 per cent, which is not half so great as the former. Now, if we compare the causes of perforating wounds at large, those caused by shell-fragments cover 86. 84 per cent, and those produced by iron-pieces only 7.89 per cent, showing a great difference.

The character of the perforating wound by an iron-piece was almost the same with that caused by a shell-fragment. The fact that the entrance hole is larger than the exit was seen in the 3rd instance. We can not assert anything positively of the first instance, for the size of neither hole was recorded, but there was perhaps the same difference with the 3rd instance, as both were perforating wounds of the soft parts. The 2nd instance was a very curious case as a perforating wound caused by an iron-piece. Inferred from the recorded character of the entrance orifice, it seems that the iron-piece was a large rough fragment which first broke the skin with its curved flat surface ; and not with the pointed part which might have rent the skin with its sharp end. However, this piece smashed the scapula from the back, then entering the arm again broke the humerus, leaving a crater-like exit. The piece must have been an exceedingly forcible one, to do so much damage but it is doubtful how a scattered iron-piece could have been imparted with so great a force. Indeed, among various wounds inflicted by iron-pieces, there are such serious kinds as mutilated wounds, but this is attributable to the ponderous size and weight of the pieces. However an iron-piece which may produce a perforating wound must naturally be limited in size and accordingly in weight. If so, we must suppose that in producing so serious a perforating wound, the iron-piece was imparted with a striking velocity, which however is almost an unallowable supposition, as was seen from the instances of the contused, blind, and other wounds caused by the same kind of objects. That only three cases of perforating wounds were produced by iron-pieces goes to show the same fact. In two instances of the three under consideration, the iron-pieces perforated soft parts, so their effect was not at all anomalous considering that the pieces had a shape fitted for penetration, but if the 2nd instance in question was really caused by an iron-piece, its force must have been exceptionally great. The injured person of the present case was reported to have received the wound in the Hiyei at about 1.20 p.m., when a hostile shell destroying the ship's side near No. 7 starboard gun, scattered iron and wooden pieces about. The shell itself was reported to have passed off without explosion, and if this report be correct, the present case can not be attributable to any other cause than an iron-piece. However, before and after that moment, that is, at about 1.15 p.m. and 1.25 p.m. many shell-fragments were scattered in that ship, and besides, all the surgeons on board having been killed, the histories of the killed and wounded had mostly to be gathered from the memory of the survivors, and consequently errors may have been committed in recording the times of the reception of injuries.

(4) There was one case of perforating wound owing to bullet which is as follows :—

One of the members of the landing party at the Pescadores was shot from a distance of a few yards with a musket, and thus received a perforating wound from the chin to the right side of the neck. The wound was lacerated 12 c.m. in length and 8 c.m. in width. The bottom communicated with the cavity of the mouth ; the body of the lower jaw was broken into several pieces, and a part of it smashed into grains like sand and the muscles at the floor of the mouth were rent asunder. The carotid sheath was exposed though the vessels escaped injury. The facial artery was crushed yet without hæmorrhage; articulations and deglutition were extremely difficult. After a time, the tissues around the wound became sloughy; and several of the broken pieces of the bone were discharged. The wound was cured in five months, but owing to the imperfect articulations and deglutition, the man was discharged from service. (No. 105.)

The wound in the above instance was a perforating one produced by a bullet, but being inflicted at a very short distance, accordingly its velocity or force being violent, the tissues of the wounded part were widely destroyed, so that the skin that will usually cover the wound canal was rent open producing a large gaping wound. This is an instance of the so-called explosive wound of bullet. When a part struck by a projectile having an extraordinary velocity, not only the pieces of broken bone but even the cells and liquids of the tissues being respectively imparted with a great momentum are prone to fly, therefore it is obvious that even a projectile so small as a bullet may sometimes do great damage as in the present case.

As above mentioned, the total of perforating wounds was 38, and they may be attributed to four different causes viz :—light machine gun shots, shell-fragments, iron pieces, and bullets. These 38 cases in proportion to a total of 629 cases of various wounds, bear no larger ratio than 6.04 per cent, showing the rareness of this class of wounds as compared with gun-shot wounds. This is the main difference between them and bullet wounds, for perforating wounds occupy the largest number in the latter class of wounds. And the characters of the perforating wounds caused by shell-fragments and iron pieces differ greatly from that of bullets. The perforating wounds by the shell-fragments, not mentioning the large size of the wound canal, have comparatively larger entrance holes than that of exits, while with that of bullets, the difference is not so striking. Again in the perforating wounds caused by the shell-fragments, the tissues around the margin of the wounds are found greatly contused, and the skin around the entrance and exit holes is discoloured, while with those of bullets, such is not the case except in an instance of an explosive wound caused by bullets in short range. This is because the gun-shot wounds are caused by such objects as shell-fragments, or iron-pieces irregular in shape and unfit for penetration. The perforating gun-shot wounds have not only a large diameter, but damage the tissues around comparatively severely, so they generally result in instant death when they are inflicted on vital parts as the chest or abdomen, to say nothing of the head, and even on the limbs the character of the wounds is by far more unfavorable than those of bullets ; for in the former, the healing process is much prolonged, and during that time wound infections are apt to occur. Though the clinical history does not record it, there were some cases of perforating wounds from which pieces of cloth were washed out. When the parts covered with the dress were perforated, there is no doubt that the severed piece of cloth enters the wound in a mass with the shell-fragment, and it will be left within unless it adheres firmly to the fragment and is extracted with it.

6.—LACERATED AND MUTILATED WOUNDS.

The lacerated wound here considered, is strictly speaking that kind of injury in which the body is severed in two, or the head or the hand is entirely torn away, but those wounds in which though a greater part of the chest or abdomen be lacerated, yet both the upper and lower halves of the body having good connection, should be called the half lacerated wounds are included in this category. The mutilated wound is properly considered, that kind of wound in which either the body is rent to pieces and scattered, so that the personality can not be identified, or the body is so demolished that almost no trace of it is left, but it is not impossible that cases which were supposed to have sustained this kind of wound may actually have fallen overboard, at the moment of shell-explosions, and which nevertheless have been counted in this class.

(A) The lacerated wounds were caused as fallow :—

Hit by entire shell	10 cases.
Hit by shell-fragments...	27 ,,
Hit by iron-pieces...	5 ,,
In the neighborhood of shell-explosions, causative objects uncertain	8 ,,
Uncertain whether hit by shell-fragments, or iron-pieces...	2 ,,
By compression	1 ,,
Total	53 ,,

(1) The ten lacerated wounds produced by entire shells were one on the head, four on the abdomen and loins, one on the chest and abdomen, one on the left forearm, one on both thighs, and two on both legs. Of these, one of the head, one of the chest and abdomen, and three of the abdomen resulted in instant death. One person who had both legs and the forearm lacerated, (No. 289) and another person who had the abdominal walls lacerated (No. 175) having escaped instant death, were carried to the surgery on the upper deck, when a shell happened to explode on the deck below at the same time setting on fire a quantity of ammunition, they soon expired by the terrible shock thus caused. One who had his thighs lacerated, and

one who had his legs crushed also escaped instant death but expired in ten minutes or more after the injury, and as these two persons alike received blind wounds from large iron-pieces on the thigh, they have already been mentioned in the instances given of blind wounds.

(2) The twenty seven lacerated wounds produced by shell-fragments, were twelve on the head, six on the abdomen, one extending from the pelvic region to the right thigh, two on both thighs, one on the right thigh, one on the wrist, one on the right middle finger, and one on the neck extending to the lower jaw, and one each on the upper and lower limbs of the same person. Twelve cases of the head, six of the abdomen, one of the neck, one of the thighs, one of the right thigh, one of the pelvic region extending to the right thigh, and one of the upper and lower limbs resulted in instant death. One case of the wrist was undergoing treatment in the surgery, when an enormous shell exploded in the room inflicting a large perforating wound on the upper part of the right thigh, and a burn covering the lower part of his body. The injured man died in ten days. (No. 261.) The only case which escaped death was the lacerated wound of the middle finger, accompanied with a blind wound of the left thigh. (No. 255.)

(3) Out of five lacerated wounds produced by iron-pieces three were on the head, one on the right leg, and one on the right wrist. Of the three cases of the head which all resulted in instant death, one was caused by a large fragment of gun-shield, another by a big fragment of funnel, and the third by a large fragment of gun-barrel. One case of the right leg was produced by a big fragment of funnel, and accompanied with fractures of both arms, the injured man died in a few hours. (No. 291.) One case of the right wrist was also inflicted by a fragment of funnel and attended with a blind wound of the left

leg, and contused wounds on the head and the left hand. This was cured in 3 months. (No. 230.)

(4) Eight lacerated wounds produced in the neighborhood of the shell explosion occurred in six persons. Of these, two were on the abdomen, two on the chest, one on the chest and abdomen, two on both lower limbs, and one on the left thigh and the right leg, all of which were killed instantaneously. However, the case of lacerated wound of the chest and abdomen, first having sustained a contused wound on the right leg was undergoing operation in the surgery, when a shell exploded in the room and he was killed on the spot. (No. 154.) The lacerated wounds now stated, are chiefly attributable to fragments of exploded shells, but they may be regarded to have been accompained with injuries by iron or wooden pieces or explosion gas, as these persons when wounded were stationed close by the place of shell explosion, where it may naturally be expected that various fragments of iron and wood would be driven about. In the clinical history of these cases of instant death, only the chief wounds were recorded to the exclusion of the smaller ones, and it was thought not proper to attribute them all to shell-fragments, so they have been classed under the head of wounds by the explosion of shells. The two wounds of the chest, and the two of the lower limbs both occurred in two persons, each sustained lacerated wounds in the chest and the lower limb. One of these occurred on the Matsushima, when an enormous shell of 30.5 c.m. exploded, and set on fire a large amount of ammunition (No. 152.), and the other on the Hiyei, when a hostile shell exploded against the stanchion near by, and set on fire the powder bag that he had hung on his breast. His chest was terribly lacerated, and at the same time the lower limbs were severed from his body, moreover his whole body was almost burned black. (No. 153.) All other cases

occurred in the surgery of the Hiyei when a hostile shell exploded there.

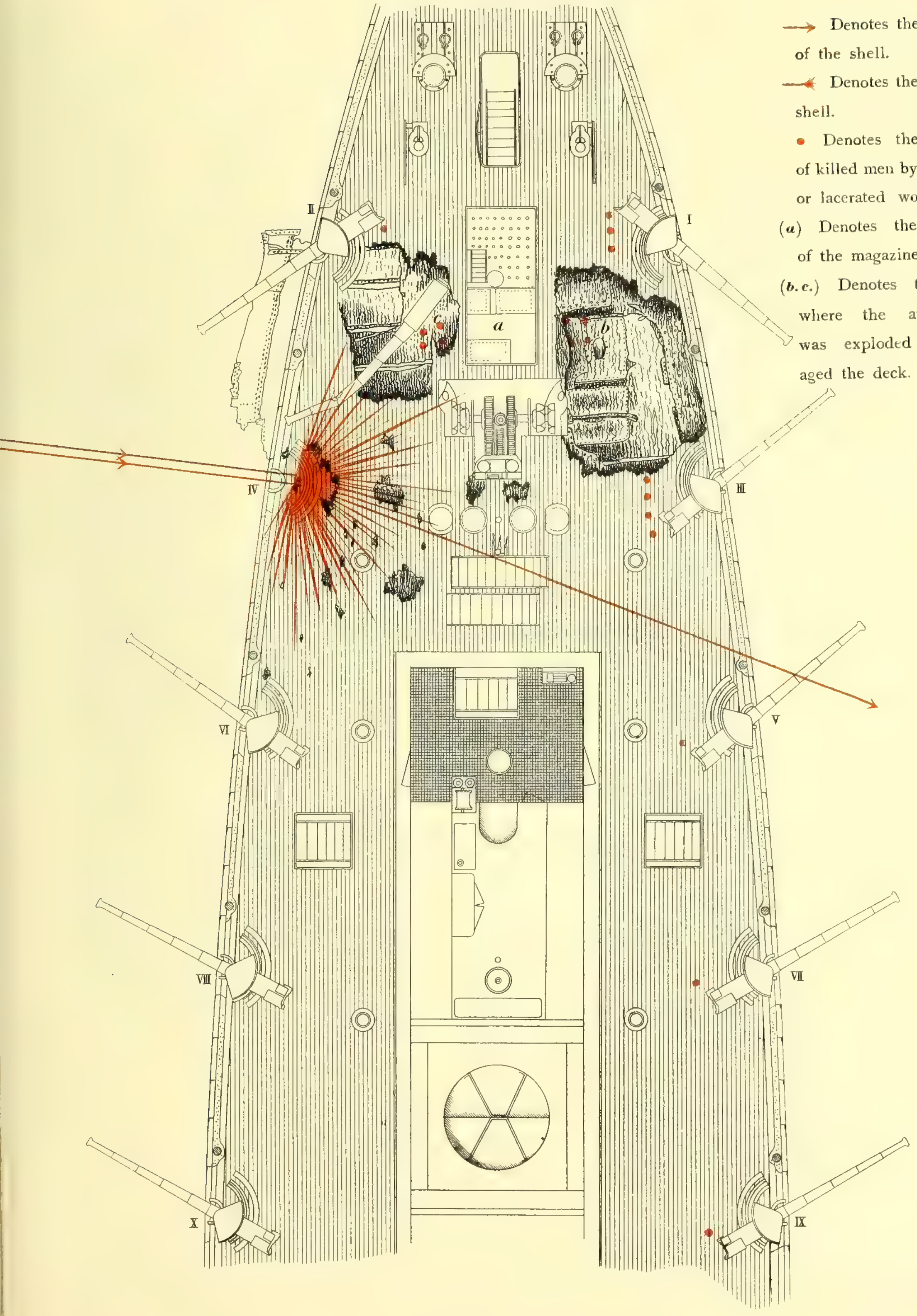
(5) The lacerated wounds of uncertain cause whether produced by shell-fragments or iron-pieces are two in number. One was caused by the explosion of a shell against the gun-support, when shell and iron fragments inflicted the wound in the upper part of the right thigh and a penetrating wound on the head. He was killed instantaneously. The other was caused by the explosion of a shell against the gun-shield, when the left little finger was crushed, and at the same time he sustained a penetrating wound of the eye by an iron-piece, and a blind wound of the left leg. The injured man was invalided after the healing of the wounds. (No. 111.)

(6) One case of a lacerated wound by compression, was caused by the compression of the right index and middle fingers between the gun-wheels while the man was engaged in firing. He was invalided when cured. (No. 242.)

Of the 53 lacerated wounds above stated which occurred in 49 persons, three cases of the crushed fingers, and one case of a crushed wrist were cured. One case of a crushed hand also sustained a large perforating wound and a burn on the right thigh and died after a few weeks. One case of lacerated wound of the right leg accompanied with a large contused wound with fracture of the upper arm died a few hours after. Each case of lacerated wounds of both thighs, of both legs, and forearms, and of the abdominal walls, though they escaped instant death, yet they expired a few minutes after being brought to the surgery. The remaining 39 persons were killed on the spot. As the lacerated wounds are caused by such forcible and ponderous objects as shells, large shell-fragments, or iron-pieces, they are mostly fatal, except in those of small portions of the distal ends of the limbs, because the effect to the system by such injury is so terrible; indeed, hæmorrhage was, as a rule, not so heavy, but the shock was found to be remarkable. The lacerated surface was in every case found rugged with soft tissues hanging like rags of uneven length, and usually with irregularly broken ends of bone. The condition of the lacerated wounds produced by such a forcible object as a shell, and that caused by a heavy object like a large iron-piece may be expected to differ from each other. However, owing to the absence of concomitant observation of these wounds in one person, we are not in a position, from the respective reports concerning them to make any distinction. Among the lacerated wounds of the head caused by shell-fragments, there were many cases in which though the scalp was rent (without any remarkable loss to its substance), and only a part of the upper half of the skull broken, yet the brain substance was so cleanly swept away that no trace of it was left except the remnant of the torn membrane. This was perhaps because such a soft and comparatively mobile organ as the brain was smashed and scattered by the momentum imparted to it by the flying shell-fragments, and this may support the hydraulic theory held by some surgeons. Accordingly, even with a shell-fragment that is only large enough to produce a perforating wound in other parts may sometimes prove exceedingly destructive when it strikes the head.

(B) Mutilated wounds make a total of thirty cases, of which 27 were those of the whole body, two of the lower half of the body, and one of the extremities; and 27 cases of them occurred in the Matsushima, two in the Hiyei, and 1 in the Akitsushima. Among the 27 cases of the Matsushima, 26 were caused by the explosion of a single shell. The rest also were caused by shell-explosion. In the Matsushima, a 30.5 c.m. shell exploded striking the shield of the No. 4 side-gun, in the fore part of the lower deck, and set on fire the ammunition stored in the neighbourhood. This event gave rise to so great a havoc as to kill or wound one hundred persons at once, of which the entire bodies of twenty five persons were totally destroyed, and four limbs of one person were mutilated. Besides these, there were four cases of instant death.—One by the lacerated wounds of the lower limbs accompanied with burns over the whole body ; one by burns of the whole body ; one by the lacerated wounds of the legs and forearms, and one by a lacerated wound of the abdominal walls—of these four, the last two cases were killed during treatment by the shock of the explosion. Thus, the total number of the killed amounted to thirty, and of the remaining seventy wounded, twenty two died from extensive burns in the following periods ;—ten within twenty-four hours of the injury, five within forty-eight hours, three within seventy-two hours, two within a week, one within a fortnight and one within six weeks (the cause of death was due to the accompanying penetrating wound of the abdomen). Such serious wounds having been produced at one time in the same ship, the condition was too dreadful to be described. Out of the thirty men killed on the spot, the stations of twenty-two of them could be ascertained as they were known to be at their assigned posts, two others were undergoing treatment in the surgery, and the body of one was found where he met his death. But of the remaining five—that is, two officers, one midshipman of the batteries, and two carriers of the wounded—it was impossible to discover in what part of the ship death overtook them, for their duties obliged them to be constantly changing their stations, and afterwards their bodies could not be found. Of the twenty-five persons whose positions could be known, two were killed by explosion gas during treatment in the surgery, and one died from burns of the whole body and the positions

Figure of explosion of 30.5 c.m. shell in the fore-part of the lower deck of the Matsushima.



→ Denotes the direction of the shell.

—✱ Denotes the exploded shell.

● Denotes the position of killed men by mutilated or lacerated wounds.

(*a*) Denotes the entrance of the magazine.

(*b. c.*) Denotes the place where the ammunition was exploded and damaged the deck.

of the remaining twenty-two who died on the spot are indicated with red dots on the accompanying figure—that is, three of the crew of No. 1 gun ; one of No. 2 gun ; four of No. 3 gun ; three of the No. 4 gun ; one of the No. 5 gun; one of the No. 7 gun ; one of the No. 9 gun; six men of the magazine party; one of the torpedo-crew who was then assisting the magazine men, and one man in charge of the electric light, whose body was found near the magazine. As shown on the figure, a couple of 30.5 c.m. shells came flying side by side, and one obliquely striking the barrel of No. 4 gun, bent it in this "╱╲"—shape and throwing it several feet away, it changed its course a little and passed off, while the other shell exploded striking the shield of the same gun and broke the shield to pieces, destroyed the windlass in the middle of the deck, and scattered a great quantity of shell-fragments and iron-pieces ; at the same time a great deal of ammunition exploded. (The amount of ammunition that was set on fire could not be ascertained, but according to the report of the Matsushima, there seem to have been six 12 c.m. steel shells and 61 ordinary shells, the quantity of powder in this ordinary shell was estimated at 9.751 Kilog. per cartridge). By this explosion of the ammunition, the lower deck was rent, the upper deck bent, and a fire broke out. Those who were near the place of the explosion of the ammunition—the crew of Nos. 1 and 2 guns and especially those of Nos. 3 and 4 guns and the magazine party—would naturally receive dreadful wounds by shell-fragments, iron-pieces and explosion-gas in fact their bodies were torn to atoms. But strangely enough, among the crew of Nos. 7 and 9 guns that were distant from the place of explosion, some were missing. It might have been expected that lacerated wounds might have been produced at such a distance ; but such serious injuries as to pulverize the body and limbs seem almost impossible, accordingly the circumstances at the time of the accident were inquired into and a survivor belonging to No. 9 gun, gave the following account:—

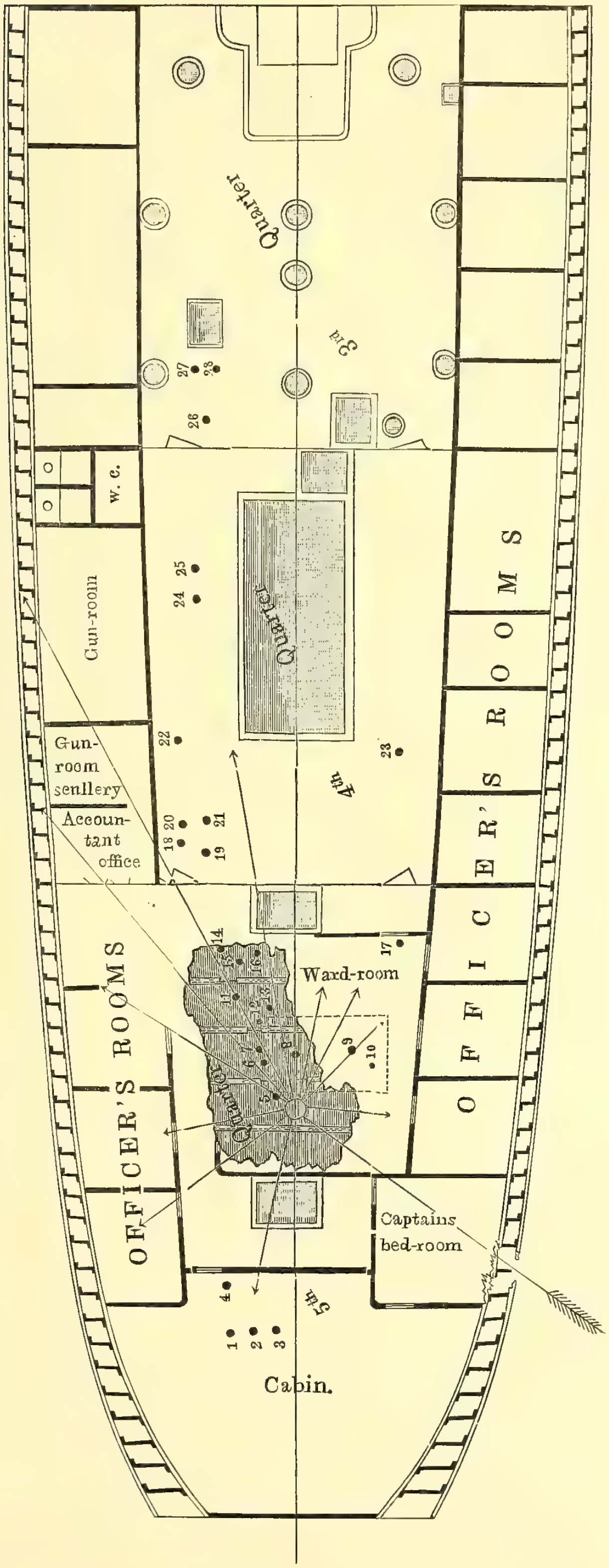
The starboard battery of the lower deck (in the Matsushima), that is, where No. 9 gun was placed had ceased firing, as they had received the order, "suspend firing" and the crew of the starboard battery were waiting their orders near their respective guns. I was then standing by the right side behind No. 9 gun about 2 yards off, when a tremendous sound that seemed to shake the whole ship to pieces arose somewhere about the fore part of the port batteries, at the same time causing a terrific shaking of the ship. Until this time, no explosion smoke had been seen, but at the forepart of the starboard batteries, shell fragments and something like a mass of earth fell like a shower of rain or hail, and they were seen to strike the under surface of the upper deck and the ship's side, and I had scarcely said, "halloo," when some shell-fragments hit my head and face, at the same time something like a mass of earth struck my shoulders and chest. From the wound of the head, blood was running down. Then again, there arose a dreadful sound, when suddenly the batteries of the lower deck were entirely wrapped in flames, and at that moment, my body was thrown up by the explosion gas, and fell in front of the clothes shelves 2 yards off between the back of the battery and the gun room. The shock made me feel as if my breast walls had been broken, and I vainly tried to stand up, but I could not see a yard before my face for flames and smoke, and felt as if I had been breathing hot ashes in the coalbunker. I now gave up all hope, and waited for death, but finding my breath did not stop, tried to run out to the upper deck, and came to the second hatch which led from the back of No. 9 gun to the upper deck, that is, to the steps above the engine-room. I could not see clearly, but there was a crowd crying and struggling to get up the gangway; and so I was waiting for my turn, when flames again began to issue from the starboard entrance threatening to burn my hands, head, and face. I then hastend back to the first hatch in front of the battery, and trying to run out, came to where I thought No. 7 gun stood. At this moment, I was again buried in flames, and in an agony of suffocation, turned twice or thrice, staggered down, and again resigned myself to my fate with; the words "I shall now die!". Once more I made up my mind to try my hardest to escape, and rushed towards the gun-port, which to my great joy I found to be that of No. 7 gun. Thanking Heaven that I had escaped once more from the jaws of death, I mustered up all my courage, pulled myself together, climbed out by the barrel, along the ship's side, and so got out upon the upper deck. There examining my wounds myself, I perceived that the two wounds on the head were very slight, and the chest which I thought had been broken, was quite sound ; the left ear gave great pain, and had lost its hearing ; the inner sides of both legs—especially the right one—pained me as if they were broken ; but were only covered with black patches probably caused by the blows of cartridge fragments ; there was a little hæmorrhage from the mouth and nose ; the hair of the head, eye brows, mustache, and hair on the back of hands was burned, but the skin was so slightly affected, that it could not be said to have sustained burns. I then set myself to extinguishing the fire, together with Tokutaro Nagano who had made his escape by the same gun-port ; and afterwards, under the direction of Commander Mukoyama we set the things on board right, and posting ourselves at No. 9 gun, resumed firing.

As regards the late seaman I. Sasaki, one of the members of No. 9 gun, there is no reason to assume that his body was blown to pieces while he was in the neighbourhood of No. 9 gun. I was one of that gun crew and did my best to find his corpse. Some persons concluded that he had fallen into the sea while escaping by a gun-port; or been thrown overboard by the explosion gas. But I think otherwise. As third member to No. 9 gun, he was on duty as shell-carrier, and was going possibly to the elevator of the magazine in the fore part at the time of the disaster, and was thus blown to pieces by the explosion of the powder. The elevator, it is true, was in the neighborhood of the starboard batteries, but both deck and elevator were found terribly damaged and everything was quite as bad here as at the port batteries. Strange to say, there were fourteen or fifteen cartridges, provided for No. 9 gun, but though the blanket covering them was blown away, not a single one exploded.

It is certain that one of the bomb-shells burst, and its contents lay all over the clothes shelves : The fragments of the bottom of that shell were found behind No. 7 gun, and between No. 7 and 9 guns was found a fragment of the bottom plate of a cartridge, which perhaps belonged to either No. 5 gun or No. 7. Of 40 gun-crews working at the lower deck batteries, only 4 persons, were able to continue working and my lucky escape was considered as a miracle by all. (Answer sent by seaman K. Miyata, member of No. 9 gun in the Matsushima).

According to this report, the missing member of No. 9 gun was probably blown to pieces, or thrown into the sea through a port-hole, happening to meet with the explosion as he came near the entrance of the magazine, and another person that belonged to No. 7 gun seems to have met with the same fate, though we can not affirm it positively in this case, for there was another shell that exploded at No. 7 gun itself. Besides these, some of the cases reported as mutilated wounds, may have been actually thrown into the sea through port-holes, etc.

The mutilated wounds that occurred in the Hiyei were of two kinds :—those of the whole body, and those of the lower half of the body. In this ship, also, a 30.5 c.m. shell knocked through the wall of the captain's bedroom on the lower deck, as shown in the accompanying cut, and entered the wardroom which had been turned into a surgery. The explosion broke the iron base of the mizzen mast. Every other thing in the room—tables, chairs, surgical instruments, and furniture—was destroyed and scattered ; the room itself caught fire, and its walls were almost ruined. On examining surgical instruments that were afterwards picked up in various places, it was found that none of them retained their original shapes :—some were broken to pieces, and the others bent ; the probes doubled up, and strangest of all a sabre was found bent into a spiral. The total number of the wounded and killed by this explosion was 40, of which 14 were killed on the spot, 1 died during that day, 1 after 4 days, 1 after 15 days, and 1 more after 17 days. The black dots in the accompanying cut show the localities where they were killed or wounded on the lower deck. All except the mutilated wounds have already been mentioned under the respective headings of wounds. However, in order that the effects given by a shell-explosion may be learned to better advantage, we shall again state the natures of the respective injuries received. The persons then in the wardroom where the explosion occurred were 2 surgeons, 1 paymaster assisting them, 3 nurses, 3 wounded persons, 4 carriers of the wounded, numbering 13 in all, and of these persons, Figure of explosion of 30.5 c.m. shell in the lower deck of the Hiyei.



the black dot (5) received a mutilated wound of the abdomen; (6) a perforating wound on the loins attended with fracture; (7) a mutilated wound of the lower-half of the body; (8) partial mutilation of the chest and abdomen; (11) mutilation of the whole body; (12) a mutilated wound of the abdomen; (14) contused lacerated wounds, and burns on several parts of the body; (15) mutilated wounds of the left thigh, and the right leg; (16) compound fracture of the face and the base of cranium. These 9 persons were all killed on the spot, and as already said, only the chief wound or wounds recognized as the cause of death being as a rule given, there must of course have been not a few cases which were actually attended with other wound or wounds. (9) Having sustained a lacerated wound of the hand, was placed on a large table used as an operating table and was receiving treatment, when he sustained a large perforating wound at the upper part of the right thigh accompanied with fracture, and a burn extending from the gluteal region to the lower extremities. A few days later, he became delirious, and died in 15 days. (10) A person on the right side of the operating table was just going to apply a bandage to the wounded man, when he was thrown on to lower deck several feet off, and sustained a dislocation of the right ankle joint and a fracture of the outer malleolus, accompanied with burns on the face and hand, and with the rupture of the tympanic membrane on each side. He was however able to return to service after recovery. (13) This was a case of compound fracture on the upper part of the right leg, with several other contused wounds on the head, face, and right thigh, and a large lacerated wound just above the left knee; also, a burn covering the whole face. Further, though it was not stated in the clinical history, the membrana tympani on both sides were ruptured. Some time after, delirium set in and the injured person succumbed 4 days after. (17)

Burns on the head, neck, chest, and upper and lower extremities attended with the rupture of both membrana tympani. The burns were healed and the hearing on both sides was gradually restored, but the person was dismissed as he became idiotic. The above mentioned 4 cases were the only ones in the room at the time of the explosion, who escaped instant death ; and of these, two died later from traumatic delirium, 1 person became idiotic, and was dismissed from the service, and the last was the only one who was completely cured. Thus, of 13 persons who were at the time in the room where the explosion occurred, 9 were killed on the spot, 2 died afterwards from their wounds, 1 recovered but was discharged, and 1 only was able to resume service. No decided opinion can be given about the killed, their chief wounds only being recorded, but the 4 persons not killed on the spot all sustained burns, and three of them further sustained rupture of the membrana tympani. Thus it can easily be seen that in cases of wounds inflicted in the very neighborhood of a shell-explosion, there will occur, besides wounds given by the blow of powerful shell fragments, iron or wooden pieces, those injuries which are liable to be caused by explosion-gas and flames. Traumatic delirium ensued in 2 out of the 4, showing a violent shock to the nervous system. This is agreeable to all experience elsewhere.

In the 4th quarter of the lower deck—that is, fore-part of the wardroom where the explosion occurred, there were 8 persons killed or wounded, of whom (18) had both thighs mutilated and died on the spot ; (19) met the same fate from the compound fractures of the face, the base of cranium and the upper and lower limbs; (20) sustaining compound fracture of the right thigh and heavy contused wounds of the right arm and chest which killed him instantly ; (21) got a blind wound in the left thigh, lacerated wound of the right middle finger, contused wounds of the right index and ring fingers, and an abrased wound of the left leg. This person eventually recovered ; but having lost the right middle finger, and the action of the index and ring fingers not being completely restored, he was dismissed after 459 days of treatment; (22) received a grooved wound on the right forearm which was healed in 37 days; (23) an abrased wound of the scalp which was cured in 3 days ; (24) a contused wound on the right thumb from a wooden splinter and recovered in 2 weeks; (25) a contused wound of the right thumb which was healed in 32 days. Thus 4 out of the 8 persons, who happened to be very near the explosion and were most exposed to the shell-fragments, received mutilated wounds, or heavy lacerated wounds, which killed 3 of them; and 1, though not killed had to be dismissed after long treatment. The remaining 4 persons happened to be some little distance from the room where the explosion occurred, or to be on the starboard side of the ship, and were thus only slightly injured. No one in this 4th quarter received either burns or rupture of the membrana tympani, several persons indeed escaped injury altogether.

In the 3rd quarter, only those persons who happened then to be at the entrance to the 4th quarter were injured, none of them being killed or succumbing to their wounds. Thus, (26) received blind wounds on the right arm and forearm attended with fracture, which healed completely after a treatment of 170 days; (27) a slight contusion on the right side of the chest which was cured in 3 days ; (28) a contused wound on the right temple which was healed in 23 days. Of these 3 persons, (26) sustained severer wounds than did (27) and (28) in the 4th quarter. This was probably because the shell-fragments came flying direct, and their power had not been impaired. This was perhaps a matter of chance.

In the cabin next to the wardroom where the explosion occurred, 4 persons were wounded by wooden splinters, and by the fire that broke out. Of these, (1) received compound fracture on the forehead, and burns on the face with hæmorrhage in the left retina. He was dismissed after a treatment of 140 days, as his eyesight did not return; (2) received an abrased wound on the lobe of the right ear which was healed in 4 days ; (3) compound fracture of the right fibula, and a contusion on the right forearm, both of which were cured in 38 days ; (4) got a large wooden splinter wedged into the left sacro-iliac joint, which caused paraplegia, and succumbed to the wound after 17 days. This (4) was the most serious case of various wounds produced by wooden splinters.

The above mentioned comprise the killed and wounded on the lower deck ; and besides these, there were 6 persons killed or wounded in the neighborhood of the machine-gun magazine below the floor of the room in which the explosion took place, shell-fragments and other indirect shells flying down through the broken floor, 2 persons were killed on the spot, with mutilation of the heads, 1 person received a penetrating wound of the head died during the day ; and the remaining 3 persons were all slightly wounded on the head, chest, and upper arm. Again, on the quarter-deck and bridge above the wardroom, there were 6 persons wounded, of whom 3 got injured by being blown down on to the lower deck ; and another was thrown down through the sky-light, and was burned by the fire. The remaining 2 were injured by shell-fragments that flew out of the sky-light, and in the wound of one of them were found some husks of buck-wheat. There were some others standing by the sky-light, whose clothes were torn to pieces by gas of the explosion.

7.—BURNS AND SCALDS.

(A) Most of the cases of burns occurred on board the Matsushima. No fewer than 55 persons got burned at the time when the 30.5 c.m. shell burst and set the ammunition on fire, besides 4 persons who were burned by the explosion of the shell. In the Hiyei, 7 persons were injured owing to the explosion of the 30.5 c.m. shell and fire; 3 persons each on the Itsukushima, Hashidate and Yoshino by shell-explosion, and 3 persons on the Naniwa by flames from the discharge of their own guns. They number 78 persons in all. Of the 59 persons burned on board the Matsushima, 25 were so seriously injured that they died, and of these persons, 1 died on the spot, entirely from burns; in the case of 2 others the burns were attended with mutilation of the limbs, and lacerated wounds of the chest; 18 died within 3 days before they had had time to be admitted to hospital, and 4 died in hospital. (Of the last 4, one died owing to the penetrating wound of the abdomen.) Of the 3 men on board the Itsukushima, 2 died on the spot owing to perforating wounds of the chest; and of the 7 on the Hiyei, 1 died on the spot from burns and contused wounds on several parts of the body, and of 2 others whose burns were accompanied with serious contused wounds, one died before he was sent to hospital, and the other in hospital. Those, therefore, who were either killed on the spot and died afterwards numbered 30 in all; and of these 30, six were killed on the spot, (of these, however, only 1 from pure burns, the rest died from serious accompanying wounds). Those who died afterwards were 24 in number, of whom 16 died purely from the effects of burns. Of these 24 persons, 4 died in the hospital, all the rest died before being admitted. Their burns were very extensive, not only exposed parts such as the face, neck, and hands being injured, but other parts also, from the burning of the clothes. In degree, the burns were mostly superficial, though in some parts, covered with clothes, it was otherwise. The burned surfaces were generally blackened by powder-fumes and unconsumed powder, and the hair was much singed. In most of these cases, symptoms of shock were very pronounced, and the patients speedily collapsed. Ten of them died in the course of the day on which they were wounded, 5 on the next day, and 4 on the 3rd day. Where there was a transition from the period of shock to that of reaction, the temperature rose in a remarkable manner, pain and thirst were intense, the patient became violent and traumatic delirium often ensued. The difficulty of treating such a large number of patients was so great as to baffle description: the surgeons and nurses were engaged in the task of dressing the wounds day and night without rest, and yet felt they still could not do all that was needed, and were therefore too busy to keep the clinical details of the cases. We can not therefore ascertain the record of each patient, but, in its general features we are told by the surgeons who witnessed the scene that the account above given is true. Patients of this class admitted to hospital numbered 43 in all. Of them 11 were only slightly burned and admitted to hospital for other and more serious wounds. The remaining 32 persons entered hospital on account of burns alone, or of burns attended with other slighter wounds. With regard to these 32 patients, we have a report furnished by Fleet Surgeon S. Tsuruda, who was engaged in the treatment of patients in the Sasebo Naval Hospital, and from this report we can form a general idea of these cases. A paragraph in the report says:—

(Burns.) Though the cases of the burns placed under the care of the hospital differed much in burnt area, they were almost all the same in other respects, I need not therefore record the particulars of each case, but shall merely indicate the localities of the burns and their terminations, and give their general appearances and symptoms.

(1) Burns on the head, face, shoulders, upper extremities, left knee, and the middle of the left leg. Completely healed on December 21st, 1894.

(2) Burns on the face, forearms and legs. Completely cured on December 22nd, 1894.

(3) Burns on the face, head, left upper arm, right forearm, back of the right hand, buttocks and the lower extremities. Died on September 23rd, 1894.

(4) Burns on the face, back, abdomen, right upper extremity, left forearm and lower limbs. Died on September 23rd, the same year.

(5) Burns on the face, neck, below the left forearm, outer side of the left thigh, leg and knee, dorsum of the left foot, antero-external part of the right thigh, and outer side of the right leg. Left the hospital convalescing on April 9th, 1895, and cicatricial contraction of the left fingers accruing, the patient again entered the hospital, and was discharged from service on September 5th, the same year.

(6) Burns on the face, neck, below the forearms. Completely healed on October 22nd, 1894.

(7) Burns on the face and the upper limbs. Completely healed on October 11th, the same year.

(8) Burns on the face, below the middle of the left forearm, and on the right forearm. Completely recovered on October 12th, the same year.

(9) Burns on the face, neck, below the right upper arm and left forearm, right gluteal region, and right thigh, attended with a subcutaneous perforating wound of the left leg. Owing to cicatrix of burns, free movements of the neck and upper extremities were interfered with, consequently he was discharged from service on March 16th, 1895.

(10) Burns on the right upper limb, and gluteal region of the same side. Completely healed on October 11th, 1894.

(11) Burns on the face, both forearms, and right leg accompanied with sprain of the right ankle joint. Completely healed on December 15th, the same year.

(12) Burns on the face, head, neck, below the middle of right upper arm, below the left elbow joint, left thigh, and right lower limb. Owing to cicatrices, the fingers of the right hand lost their movements, and accordingly the patient was dismissed on March 17th, 1895.

(13) Burns on the face, neck, below the lower part of the left upper arm, right forearm, back of right hand, and both legs, attended with lacerated wound of the upper arm, the patient left the hospital on February 21st, the same year, quite convalescent.

(14) Burns on the head, face, neck, right side of the chest, back, right upper limb, left forearm, back of left hand, right lower limb below the right gluteal region, and left thigh. Died on September 29th, 1894.

(15) Burns on the face, below both forearms, attended with a perforating wound in the ball of the left thumb. After being transferred to the Kure Naval Hospital, he was completely cured on December 16th, the same year.

(16) Burns on the face, both forearms, and antero-external side of the left leg. Completely recovered on October 12th, the same year.

(17) Burns on the face, neck, and both forearms. Completely recovered on November 5th, the same year.

(18) Burns on the face, head, nape, below left gluteal region, and right thigh, accompanied with compound fracture of the left index finger. The burns were healed, but the left index finger having been lost, he was discharged from service on March 16th, 1895.

(19) Burns on the head, face, back, both upper limbs and below both gluteal regions. On account of the imperfect movement of the limbs, the person was dismissed from service on January 22nd, 1897.

(20) Burns on the face, back, right upper arm, and both lower limbs. Completely healed on November 11th, 1894.

(21) Burns on the face, chest, abdomen, and right upper extremity. Completely cured on November 11th, the same year.

(22) Burns on the back. Completely recovered on October 5th, the same year.

(23) Burns on the face, back, and both upper limbs. Completely healed on October 11th, 1894.

(24) Burns of the face attended with contused wound of the left hypochondriac region. Perfectly recovered on October 10th, the same year.

(25) Burns of the head, face, right shoulder, lower parts of both upper arms, as well as of both legs. The patient left the hospital convalescent on April 9th, 1895.

(26) Burns on the face, and below the lower ends of right forearm, attended with sprains of both ankle joints. The burns were healed, but owing to derangement in the ankle joints, he was discharged from service on June 6th, the same year.

(27) Burns on the right leg accompanied with sprain of the right ankle joint. Perfectly recovered on December 30th, 1894.

(28) Burns on the head, face and both forearms accompanied with sprain of the right ankle joint, and rupture of both membrana tympani. After being transferred to the Kure Naval Hospital, the patient completely recovered on December 21st, the same year.

(29) Burns on the face, left side of the chest, and left lower extremity, attended with rupture of both membrana tympani. After transfer to the Kure Naval Hospital, the patient recovered from his burns, but owing to the perforation of membrana tympani, the hearing of either side was greatly impaired, and the man discharged from service on April 18th, 1895.

(30) Burns on the face, nape and right forearm. After transfer to the Kure Naval Hospital, completely cured on November 5th, 1894.

(31) Burns on tho lower part of right leg and on right foot. After transfer to the Kure Naval Hospital, completely recovered on October 24th, the same year.

(32) Burns on the face, both hands and both legs. Completely healed on October 16th, the same year.

Causes and localities of burns Of the 32 patients above mentioned, 28 were injured on board the Matsushima, all by the explosion of gun-powder, 2 on the Yoshino, by the explosion of a hostile-shell, and the other 2 when the Hiyei was set on fire. The burns, as already indicated were mostly in exposed parts such as the face and limbs, and rarely in places protected by clothes. This was perhaps because, the explosion being instantaneous, the flames had not time enough to set the clothes on fire, and also because those who were severely wounded had all died before they were admitted to the hospital. The wounded are said, at the time of their injury, to have been wearing flannel shirts, under-drawers and Japanese socks.

Area and depth of the burns. Accurate measurements were next to impossible, but speaking generally, in 3 cases (Nos. 3, 4, 14 above mentioned) the area of burns exceeded two thirds of the whole body : in one case the area exceeded one third of the whole body (No. 19) : in the remaining cases, the total areas were always less than one-third of the whole body. The depths of the burns bore no comparison to the extent of their areas, being mostly in the 1st or 2nd degree. However, in the case of the above mentioned 4 patients, some of the burns were of the 3rd degree, and the right hand of patient No. 14 was sloughed all over.

Appearances of the burned surfaces. The patients of the Matsushima were admitted to the hospital on the 4th day after the battle, those of the Hiyei on the 5th day, and those of the Yoshino on the 10th day. When first admitted, in the heavier cases, the faces were blackened, the hair singed, and the heads and faces covered all over with yellowish black scabs: the eyes closed, the nostrils blocked, the ears swollen, and the mouths unable to open easily. In the less severe cases, the faces were blackened and the eye-balls streaked, the limbs and trunks were in some parts only reddened, while in other parts there were blisters, the epidermis being abrased here and there; the blisters presented various colours (gray or dark red) according to the nature of the matter accumulated in them. Parts where the epidermis had been abrased, and the true skin was exposed, were sometimes smooth and of a pinkish hue, at other times, granular and red; in a few cases the parts had already sloughed: in short, the burns differed in appearance according to their severity and locality.

About a week after admission to the hospital, the dried scabs and destroyed epidermis had gradually come off, leaving the true skin exposed:—The blackened faces of a few days before were gradually becoming pale, or pinkish, or absolutely white with scarlet dots (extravasation) here and there; and the ears, eyes, nostrils, and mouth were gradually opening. (No remarkable change had yet taken place in the looks of the less serious cases). During the convalescent stage, the looks of the patients underwent a second change:—that is, the faces that had been pale at the period of suppuration gradually became light-brown, and then dark brown; and those which had been flushed turned by degrees to a dark red. It will be remembered that each of these stages had its own colour, according to the severity of the burn as well as the constitution of the patient. In the limbs, in the more severe cases, there were left peculiar wavelike cicatrices bright and smooth, or keloid cicatrices dark red and ridged, while with slight cases only light brown cicatrices were left.

Cicatrices and deformities. There were four cases in which remarkable cicatrices and deformities resulted. One (No. 5) lost the grasping power of the left hand, owing to the cicatrix of the fingers; one (No. 12) lost the larger part of both ear-lobes, and had all the fingers of the right hand stiffened, owing to the adhesion of the extensor tendons of the fingers, this being caused by a deep cicatrix on the back of the hand; and one (No. 19) was deprived of the greater part of both ear-lobes, large and conspicuous cicatrices being left on the upper and lower limbs. Another case (No. 9) resulted in a marked keloid cicatrix on each burned surface, so that the fingers became crooked, the neck bent, and the mouth distorted. The patient was pitiably disfigured.

Complications of the burns. Traumatic delirium occurred in two patients, bronchial catarrh in 5 or 6, inflammations of auditory canal and conjunctiva, existed in nearly all cases of burns on the head and face, though their exact number was uncertain, intestinal ulcerations and nephritis were unknown.

Termination of the burns. With the patients who died in the hospital, the conditions before death were nearly always the same :—Temperature abruptly rising to 39° or more ; thirst intense ; pulse accelerated ; spirits roused ; delirium, cries, or singing ; withal, the mind firm without derangement in speaking, and answers correct. As death approached, the mind seemed to be as it were stunned, and the dying became mute, as in the case of sudden death : no response was given either to call or irritation ; heart action grew faint, pulse impalpable, inspirations being shallow, and expirations prolonged, and then first the heart ceased to beat, followed by cessation of breathing, and death ; thus change of symptoms was exceedingly rapid.

There is indeed no wound that is not attended with pain, but no injury seems to be so intensely painful as a burn. Many of the patients cried and groaned throughout the night. When the time came for changing the dressings, the pain felt seemed to be so great that one could scarcely bear to see it. In one case the burned areas were so extensive that it required 3 or 4 hours to dress them all. It was a matter of great difficulty, even to dress the wounds bit by bit. One or two parts were dressed at a time, after which dressing materials were put on thickly, so that one dressing might last for as long as possible ; but unfortunately it was the hot season, and there was always the danger of maggots being bred in the wounds if left too long without fresh dressing. Shell-wounds are cruel but a burn is the most cruel wound of all. We can not think of the scenes in the hospital without shuddering.

(B) There were 8 cases of scalds, which were all caused by the steam and boiling water in No. 9 torpedo boat, when its boiler was destroyed by a hostile shell. Of these 8 persons, 4 were killed on the spot, one died during the day, and one more on the next day, their scalds extending nearly over the whole body. Of the two that recovered, one received scalds on the face, hands, and both legs, which healed in a little more than 80 days, while the other only sustained scalds on the right leg and was well in a week.

8.—RUPTURE OF TYMPANIC MEMBRANE.

Five persons that were so injured, by the gas produced by the explosion of a shell close by. Of these 5 persons, 3 sustained rupture of membrana tympani in both ears, and one in one side only, both attended with burns of the face. The remaining one had the membrane of one side ruptured, and though he had not sustained any burn, his clothes were torn to pieces, evidently by forcible gas. Similar instances of clothes having been torn to pieces by explosion gas are found elsewhere ; and there may perhaps have been many cases attended with rupture of the membrane among those who were killed on the spot, or died soon after from other wounds. There were 11 other cases caused by the vibration of air, and 1 case caused by explosion gas, both consequent on the firing of our own guns. Of these 12 persons, only 3 persons were injured in the membrana tympani on both sides.

CHAPTER V.

COMPLICATIONS OF WOUNDS.

1.—HÆMORRHAGE.

With the exception of contusion, we suppose that all wounds alike are attended at first with more or less hæmorrhage. It is true that the hæmorrhage and pain in the first stage are nothing more than the inevitable symptoms of wounds, but for the sake of convenience, we will give them special headings.

(1) Primary hæmorrhage. In naval warfare, hæmorrage is comparatively slight with every class and description of wounds. Every shell wound destroys tissues, and bruises more or less extensively the tissues of the surrounding parts ; so whenever an injury is inflicted the vascular tissues sustain more or less contusion above and below. When the vessels are rent, their middle and inner coats are first torn, and curled inwards ; then the outer coat hangs loosely down, so that the coagulation of blood in the vessels is greatly facilitated. Moreover, with a mutilated or seriously lacerated wound, a severe shock will often occur which retards the function of the heart and still more facilitates coagulation. This is the reason why the hæmorrhage is so small with shell-wounds.

After the conclusion of the war, one hundred questions were drawn up relative to wounds and various sanitary matters, and answers were collected from surgeons. The following are the replies as far as they relate to the question of hæmorrhage in shell-wounds :—

Comparatively slight: ... ... Fleet Surgeon K. Yamamoto.

Comparatively slight, except when large arteries of limbs are injured: ... ... Staff Surgeon S. Suzuki.

No hæmorrhage occurred from the facial artery in a case of compound fracture of the lower jaw by a rifle bullet:
Staff Surgeon Y. Saito.

Hæmorrhage comparatively small, compared with incised or punctured wounds: ... ... Fleet Surgeon S. Suzuki.

Hæmorrhage is not generally heavy enough to cause death, unless large vessels are injured: ... ... Staff Surgeon H. Fujita.

Hæmorrhage slight: ... ... Surgeon K. Koyano.

Hæmorrhage recognised to be comparatively small:
Staff Surgeon K. Maki.

Ditto: ... ... Surgeon I. Yamashina.

Comparatively small: ... ... Staff Surgeon M. Kusano.

Comparatively small, and not a case was observed in which blood spouted: ... ... Staff Surgeon K. Ogizawa.

Arrest of hæmorrhage was scarcely needed, but there was a danger of secondary hæmorrhage: ... ... Staff Surgeon Y. Amadera.

Hæmorrhage comparatively slight at the time of injury so that when the wounded men were brought to the surgery, the hæmorrhage was mostly found to have ceased of its own accord; perhaps because the wounds were either lacerated or contused, or because owing to shock, the action of the heart was weakened; there was therefore almost no need of stopping hæmorrhage: ... ... Surgeon S. Yamashita.

Hæmorrhage was very slight in every wound: ... Surgeon K. Mochizuki.

Hæmorrhage was comparatively small: ... ... Staff Surgeon H. Yamazaki.

Hæmorrhage was so very slight that not even dropping occurred: ... ... Staff Surgeon B. Seki.

Hæmorrhage from the wounds was comparatively slight, and the discovery of bleeding vessels proved difficult:
Surgeon T. Shikano.

Hæmorrhage heavy when an incised wound was inflicted by a powerful shell-fragment, but slight when a lacerated wound or such like was caused by a weak shell-fragment: Staff Surgeon K. Iki.

Hæmorrhage was recognised to be particulary slight in a lacerated wound caused by the fragment of a funnel, and when the patient was brought to the surgery, it was found to have almost ceased. Also small in every other wound: Surgeon T. Nakao.

Though I had no opportunity of observing a case attended with injury of a large vessel, hæmorrhage from the wounds was comparatively very little, just as in other lacerated wounds produced by the pressure of some blunt body: Fleet Surgeon S. Kimura.

Hæmorrhage was not heavy in shell-wounds as compared with other injuries, for in the former the tissues are either destroyed, lacerated or mutilated: ... ... Staff Surgeon B. Tomatsuri.

With the mutilated wounds of both thighs and both legs, hæmorrhage was found to be very copious, but in other kinds of wounds comparatively slight: ... ... Satff Surgeon T. Murakami.

Comparatively small in quantity: ... ... Surgeon S. Negoro.

I observed a case in which the lower jaw was smashed and the facial artery was rent, almost without the loss of a drop of blood: ... ... Surgeon K. Toyama.

I did not notice any case of spouting hæmorrhage; the bleeding mostly stopped of its own accord, and what hæmorrhage there was, of an oozing nature as the dressings were found wet a few hours afterwards: ... ... Surgeon K. Usui.

I observed a case of mutilated shell-wound at the lower part of the forearm attended with burns, and another case of lacerated wound of the forearm, attended with fracture of the ulna and injury of the artery, and found hæmorrhage very slight in the former case and heavy in the latter: Surgeon N. Takenouchi.

Hæmorrhage was so slight that it had stopped when the wounded men were brought to the surgery, and there only a slight hæmorrhage took place when the wounds were explored : Surgeon K. Asano.

Hæmorrhage was not heavy : ... ... Surgeon Y. Fujii.

On the Hiyei, I examined a case in which 16 hours had elapsed since the injury. The hæmorrhage was wonderfully slight—so slight that it hardly deserved the name. In some cases attended with fracture, the hæmorrhage was heavy owing to bleeding from the marrow. I can say nothing about the more serious cases, as I did not see them until death had taken place : ... ... Surgeon K. Yoshimura.

There were many cases in which hæmorrhage took place at the moment of injury, but ceased almost immediately : Surgeon K. Tawara.

Hæmorrhage was very slight, probably owing to blood coagulation consequent on the laceration of vessels. For instance, when amputation was performed in the case where the wrist was mutilated, and the hand hung on to the wrist by a single piece of skin on the ulnar side (No. 261), a coagulated column of blood was extracted from the radial as well as the ulnar artery which measured several inches long : ... ... Surgeon K. Asai.

Hæmorrhage was, as a rule, recognised to be slight : Surgeon T. Kagami.

Thus, the observations of all the surgeons coincide in showing that hæmorrhage was slight. These observations are of course of a general nature and do not hold good for all cases, for as is seen in the clinical histories of the second chapter, there are some cases recorded which were attended with heavy hæmorrhage. This depends greatly on the injury to the blood vessels ;—when they are rent asunder, coagulation is rapid, as already shown, and accordingly hæmorrhage is slight ; but when they are only perforated or half rent, the middle and inner coats of the vessels being hindered from curling up, coagulation does not take place, and consequently hæmorrhage will be heavy, as is well known. Shell-fragments and iron-pieces are irregular in form, and have sharp angles and keen edges. They not unfrequently give partial laceration to the blood vessels, besides complete laceration of them as in the mutilated wounds, consequently hæmorrhage will be severe in such cases. Strange to say some cases are recorded in the clinical history of heavy hæmorrhage of those killed by mutilated wounds; but this was not always from personal observation of the surgeons, who not being eye-witnesses depended on the reports of others, and consequently it is difficult to ascertain positively the real amount of hæmorrhage. But in the cases Nos. 264 and 290 clinical history of mutilated wounds of both thighs and of both legs, which occurred in the Tsukushi, hæmorrhage was observed to have been copious by the surgeons themselves. The arteries of the thigh are too large even though torn asunder to form enough coagulation as to immediately stop hæmorrhage, therefore if not attended with shock, hæmorrhage may continue to the moment of death, and even if arrested at once, the loss of blood will still be very great. The blood-vessels of the leg also are not small, so the loss of blood was probably great. These two cases were caused by the impact of an entire shell of great velocity, and the difference in its effect from that of a wound by a shell-fragment, is much the same as the difference in being wounded by a sharp sword to being cut with a blunt blade, this probably accounts for the heaviness of the hæmorrhage. At any rate, it is certain that hæmorrage did not last long, for shock was heavy in both cases and the injured persons died in a few minutes. Another instance (No. 291 clinical history) occurred in the Fuso: a case of a mutilated wound of the middle of the right leg by a fragment of funnel, and of a compound fracture on the right and the left arm. The clinical history states that in this case hæmorrhage was copious in each wound, the face turning pale, pulse thready and intermittent, and the patient almost instantly falling into unconsciousness. This is quite natural, because the tissues having been roughly destroyed by a weighty iron-fragment a severe shock took place ; hæmorrage ought to have been very slight, and it seems rather strange that the contrary is recorded. But iron-pieces and shell-fragments do not always have the same effects, some of them having keen edges may happen to sever or half sever a blood vessel, in which case heavy hæmorrhage may occur from such a wound. But this reason can not be put forward in this case and if it is true as recorded, that hæmorrhage was heavy from each wound, then it must be put down to the peculiar constitution of the injured person, and the unconsciousness accordingly attributed to the heavy hæmorrhage.

As regards shell wounds, it is very rare that the injury of a blood vessel is the sole cause of death, for instance, according to the clinical history, No. 154 received a deep contused wound on the inner side of the lower third of the right thigh, by which the femoral artery having been injured, hæmorrhage took place, the bleeding however being at once staunched by the application of a compress by a carrier, the patient was brought to the surgery and receiving treatment, when the explosion of a shell, mutilated his chest and abdomen and caused instant death. This is an instance of an injured artery where hæmorrhage does not seem to have been heavy, he might have recovered if he had not been subsequently struck with the explosion of the shell. Among the killed by the penetrating wounds of the abdomen, there are one or two cases in which the cause of death appears to have been hæmorrhage owing to the injury of large blood vessels in the abdomen. But this is merely supposition, and not proved by autopsy, for such a severe wound of the abdomen may produce death independent of hæmorrhage. Besides these, there are only two other instances in which hæmorrhage seems to have been the cause of death :—that is ; No. 127 clinical history, of which the only record is that a shell-fragment penetrating the front of the neck, pierced the trachea and œsophagus injuring the right carotid artery and caused instant death owing to heavy hæmorrhage. The statement is too brief to learn from it the size of the wound orifice, and whether the cervical vertebræ were injured or not, etc. But judging only from the report, we think the perforation of the trachea and œsophagus is in itself serious enough to prove fatal sooner or later ; but had it not been for the injury of the right carotid, probably instant death would not have supervened, but the heavy hæmorrhage must have had much to do with accelerating it. Also as the injury of the carotid artery is liable to involve the vagus nerve, this may also have assisted in causing death. The other is a patient of No. 143 clinical history, who died from hæmorrhage. He received a penetrating wound on the left side of the chest breaking the 5th and 6th ribs, and owing to copious bleeding hæmothorax was produced to which the patient succumbed on the next morning. This wound was attended with a blind wound on the lower limb which however was not serious. As was already discussed in the foregoing chapter, it seems the shell-fragment did not enter the thoracic cavity, but came out after breaking the ribs, and the rupture of the intercostal arteries was indirectly caused by the smashed pieces of the ribs. Again, admitting that the shell fragment pierced the thorax, it must be considered merely to have fallen in the cavity, as there existed no symptoms of lung injury. Therefore, the wound by itself was not serious enough to cause speedy death, but hæmorrhage was the real cause. So, if the injured vessels had been ligatured, his life might have been saved. It is much to be regretted that at the time it was impossible to do so (further reference to this will be made in the next chapter.) In shell wounds of all other parts, when blood vessels smaller than middle sized are injured, hæmorrhage is not heavy, and it will almost always stop of its own accord, if dressings are applied. But in cases of injury of the intercostal vessels, the pressure given by the application of dressings does not reach the vessels, and the blood coming out of these arteries flows into the pleural cavity, and does not have such a favorable effect in procuring the coagulation of blood as is the case with the hæmorrhage of other blood vessels, in which the blood coagulating by degrees in the tissues and increasing the internal pressure of tissues, favors further coagulation. Accordingly, hæmorrhage may naturally last till the time of death, and in such cases it is needless to say that timely ligature of the injured vessels is of the utmost importance.

(2) Secondary hæmorrage. It has been argued that with shell wounds produced by any cause, the tissues are destroyed, the marginal tissues contused, so that sloughing layers are most liable to be produced at the edges. When the sloughs come off the blood vessels having also sustained contusion, hæmorrhage may probably set in, even though it did not take place at first. But strangely enough, in the late war there occurred almost no secondary hæmorrhage. The only case in which any secondary hæmorrhage may be said to have taken place in the patients admitted, is the case of No. 225. During his sleep at night, hæmorrhage occurred from the small wound on the temple, which was rather profuse in quantity, but owing to prompt ligature of the vessels, it was directly staunched, before anything serious had occurred. This was the only case of secondary hæmorrhage among the patients in the hospital, and the interval between the reception of injury and admission being mostly 3 or 4 days, none probably

happened before the patients were placed in the hospital, neither does the clinical history remark on any such case.

2.—NERVOUS SYMPTOMS.

(1) Shock: In the shell wound produced by any cause, tissues are roughly crushed by an object unfavorable to penetration, and therefore considered theoretically, shock should very often occur. However, on this point, the observations of the surgeons do not agree as will be seen from the following answers on this subject as one of a hundred questions set to them.

Symptoms of concussion were noticed in most serious cases:
Staff Surgeon S. Suzuki.

Symptoms of concussion were very slight, perhaps owing to the mental excitement of the injured men: ... ...Fleet Surgeon S. Suzuki.

I did not observe any case in which symptoms of concussion existed: ... ... Staff Surgeon K. Maki.

None of the wounded men presented symptoms of concussion:
Surgeon I. Yamashina.

There were many cases in which serious symptoms of concussion occurred: ... ... Staff Surgeon K. Ogizawa.

Comparatively rare: ... ... Staff Surgeon Y. Amadera.

During the battle, the minds of the combatants were so extremely excited that even among the seriously wounded, some of them did not forget their duty, and although their faces became pale and pulse weak, they retained their equanimity, and it was not until the fight was over, that their vitality was abated and showed symptoms of concussion: ... ... Surgeon K. Mochizuki.

Concussions were comparatively severe: ... ... Staff Surgeon H. Yamazaki.

There was almost no case attended with concussion:
Surgeon S. Yamashita.

Even in cases of mutilated wounds, I did not observe symptoms of concussion : ... ..., ... Surgeon T. Nakao.

As a rule, symptoms of concussion were heavy, but there was a case of a large perforating wound of the abdomen not attended with concussion at all : ... ...Fleet Surgeon S. Kimura.

I observed severe shock in two patients with mutilated wounds of the lower limbs; especially so with the patient who had both his thighs mutilated : ... ... Staff Surgeon T. Murakami.

Concussions were comparatively severe : ... ... Surgeon S. Negoro.

During the battle, as the mind was excited there were some who, though wounded yet feeling no great pain, stuck to their post, but others though not heavily wounded, yet, presented symptoms of concussion. This was the case, firstly with the patient who was inflicted with a blind wound on the chest wall with a fragment of shell retained between the ribs; secondly with another who sustained a contused wound in front of the chest; and thirdly with one who received a contused wound on the front part of the elbow, which joint however was safe. In these 3 cases the symptoms were rather serious. These were abstainers and of quiet character : ... ... Surgeon K. Usui.

Observing two patients of contused wounds attended with fracture of the upper limb, I found that concussion was not marked : ... ... Surgeon N. Takenouchi.

I observed concussion in a patient who sustained a perforating wound of the thigh accompanied with a contusion of the chest, and hæmoptysis occurred. In about 15 minutes reaction set in. In any other case, I did not notice signs of concussion : ... ... Surgeon K. Asano.

There were very many cases attended with concussion in the wounded of the Hiyei : ... ... Surgeon K. Yoshimura.

Though I did not observe any constitutional signs of concussion, I found local concussion to be marked : Staff Surgeon T. Nakashima.

Concussions were comparatively heavy : ... ... Surgeon K. Kagami.

I saw no concussion occurring from the wounds of shell-fragment, but saw it in a patient who sustained a contused wound by a wooden splinter: ... ... Surgeon K. Tawara.

We see therefore that concussion and its degree not only depends on the character and position of the wound, but also on the constitution of each individual and his condition at the time of injury; which accounts for the surgeons on the various ships not agreeing in their observations. With regard to the characters of wounds, those produced in the naval battles would naturally be more subject to concussion than those occurring elsewhere. Especially, wounds on the head, chest, and abdomen are susceptible to shock, and even those of the limbs when the wounds are of a mutilated kind. However, this does not always hold good, because the condition of the wounded person at the time of injury has much to do with it. It has long been proved that the mind of combatants being excited at the time of fighting, there are cases in which in spite of fatal wounds, concussion does not occur. In our late war also, there were not a few persons who received large perforating wounds of the abdomen, or mutilated wounds of the limbs; but they did not show any signs of shock until death supervened. But those persons who were in the neighbourhood of the explosion of shell, no matter the causative objects or the size of the wound, were often attended by concussion, as the body received such a shock as to paralyze the nervous system. This accounts for many more instances of concussion observed by the surgeons on board the Matsushima and Hiyei. Besides, in the Matsushima numerous cases of extensive burns occurred which as is well known occasions serious shock. In addition to this in the various ships many fainted at the time of injury, as is shown by Nos. 132, 138, 139, 203, 211, 291, 324, etc., in the clinical history, which were all less serious cases.

This depends greatly on the character and position of the wound, and the condition of the wounded person at the time of disaster. Now in the late war, concussion was recognised to be comparatively frequent in the contused wound or contusion of the chest ; especially in the wounds caused by the blow of an object unfavourable for penetration such as a wooden splinter ; and also in the wounds produced at the same time with the shock of explosion. It is true that this depends on the constitution of each individual, but it has not necessarily any relation with his timidity or courage as is widely known.

(2) Traumatic delirium. In the Matsushima and Hiyei, this symptom was seen among those who were wounded in the neibourhood of the places where enormous shells had exploded, but in no other case. In Matsushima these were all cases of burns, of whom 2 or 3 died before they were admitted to the hospital, and 2 died in the hospital. Each was burned extensively over the body. There were, also many patients suffering from burns in the hospital, in whom nervous symptoms, more or less irritating, manifested themselves. Unable to sleep well at night for pains, they lay groaning, crying, or singing aloud, but as the mind remained clear, it could not be said that they were delirious. Two patients were affected with delirium on the Hiyei:—one had sustained large contused wounds on the head, and lower limbs, attended with burns on the face; the other had first received a mutilated wound of the hand, and afterwards a large perforating wound of the thigh, and burns. The one died 4 days after injury, and the other 15 days. These cases were probably, partly owing to the disturbance of the nervous system by the shock of explosion, and partly owing to the exhaustion of the nervous system occasioned by sleeplessness consequent on pain.

(3) Paralytic insanity consequent on the lesion of the cortical

substance of the brain accompanying contused wound of the scalp. There were two cases: one was No. 9 example of contused wound by shell-fragment, and the other No. 1 example of contused wound by a wooden splinter. In each case, as we have already considered, the compression of the sensory and motor centres near the fissure of Rolando seemed to be the cause. The precise character of the lesion could not, however, be ascertained, for not only could no injury be recognised on the skull, but the patient afterwards completely recovered. (See examples of the wounds in the preceding chapter.)

(4) Injury of nerves. With shell-wounds, a nerve may sustain contusion, or may be partly or entirely severed; but it also frequently happens that a large branch will escape injury on account of a favoured position or stout sheath. This is especially the case when the man is hit by an obtuse headed missile like a bullet. In this war, there were only 2 cases in which rather a large nerve was plainly injured by a shell-fragment or piece of iron or wood. One is No. 7 instance of contused wound by an iron piece in the last chapter, in which a contused wound sustained just above the internal condyloid eminence of the right humerus. At first, there seemed to be no lesion in the ulnar nerve, but paralysis accruing in the distributing region, the nerve must have suffered a contused wound by being compressed between the iron-piece and the bone. The paralysis lingered on after the wound had healed, but disappeared ultimately. The other case is No. 10 instance of a perforating wound by shell-fragment in which the middle of the humerus was perforated from back to front. While the splint was being applied, no paralysis was recognised in the limb, but when afterwards the splint was removed, paralysis was found in the region supplied by the musculo-spiral nerve, and this was never completely cured. We could not ascertain the character of the wound,

that is, whether the nerve was contused or lacerated but inferring from the position of the wound orifice, it is beyond doubt that at any rate the nerve was injured by a shell-fragment, and we believe that this is not one of the cases very rarely met with in which, owing to irregular development of callus, a nerve is compressed so as to suffer functional derangement. Therefore, with wound sustained in parts having a trunk of nerve, it is important that the inside of the wound should be at once examined, in order to ascertain whether the nerve is safe or not; and if it be found lacerated such measures as nerve suturing should be taken before the nerve undergoes degeneration.

3.—SUPPURATION.

In the case of patients so heavily injured in the engagement of the Yellow sea, as to need hospital treatment at home, the wounds were almost all found suppurating when received into the hospital. Ample provisions had been made before the commencement of the war to prevent suppuration by strict attention to antiseptic measures. The result was therefore quite contrary to our expectation, but much though we regret it, it could not be helped under the circumstances at that time.

Shell wounds are frequently heavy, and always of a lacerated nature, so that tissues around the wound usually sustain serious contusion : the tissues of the afflicted surface lose their vitality, and with it their power to resist micro-organism, and thus even a few micrococci multiply at once and bring on suppuration. This is a fact long ascertained by experience. Moreover, the tissues around the wound are torn irregularly, so that extremely irregular cavities being thus formed, which once invaded by micro-organism, cannot easily be sterilized.

Hence, in order to prevent a shell-wound from suppurating, ordinary antiseptic measures are of no avail ; strict precautions must be taken under careful management. The usual method of disinfection nowadays is, before an operation, first, to cleanse the skin of the part with soap and warm water, next to rub with a brush, and then to irrigate an antiseptic solution like carbolic acid, followed by a cover of cloth dipped in the same solution. If the disinfection of instruments &c., be also perfectly effected, the operation will mostly prove successful without any fear of suppuration. It has been however proved by experiments, that if a superficial layer of the disinfected skin, be sliced off for an experimental cultivation, the growth of micro-organism will generally be observed. This shows that there still lie some micro-organism concealed in the skin after the usual disinfection, which may sometimes find their way to the operated surface. But in a case like this, the tissues of the wound surface are destroyed only to a thin microscopical depth, whilst the surrounding tissues are healthy and retain their strength of resistance, and the micro-organisms entering that part are very few in number, therefore the multiplication of micro-organism is prevented and the first union is generally successful. But though such antiseptic measures may prove effective with usual wounds, with shell-wounds they can not be said to be perfect ; for when invaded by pus cocci hidden in the skin, however few they be, the surrounding tissues which have lost their resisting power, are very liable to suppurate. This is one of the causes that make shell-wounds suppurate more frequently. Again, it is a very difficult matter to obtain a suitable surgery in every ship, and temporary surgeries in the wardroom or the gun room, are often extremely inadequate viewed from an antiseptic point of view. Moreover during a battle, the scuttles are mostly closed up, and light and air excluded ; the firing of guns keep the ships in agitation; and every thing is filled with the dust and dirt of an engagement. Amidst such conditions, it was almost impossible to preserve the wounded surfaces from being soiled.

The clinical history does not record many wounds in which a piece or pieces of cloth remained within. But considering the shape of the objects causing shell-wounds, it seems very likely that a piece of cloth or some torn fibres should be carried into the wounds, not only in blind wounds, but in perforating or contused wounds, in parts covered with clothes ; and if such a piece be carried deep into a wound, its surface being very irregular, removal of the piece is extremely difficult. This becomes another cause of the wound being liable to contamination. The circumstances of the time and the nature of the wounds combined to make suppuration easy ; and a wound once suppurated is very difficult to stop. Moreover in most ships, with a few exceptions, two surgeries were provided one fore and one aft ; each surgery had only one surgeon assisted by one or two nurses, and when wounded persons were carried in, one after another, no proper treatment could be given owing to the insufficiency of hands. Even if a larger staff had been provided, it would have been impossible to give much time to a single patient, for numerous patients might be brought in at any moment. During the battle therefore urgent and temporary measures only, could be taken, and on the evening when the engagement was over, each patient was for the first time properly treated according to the nature of his wounds. At this time undoubtedly, the best care possible was taken for the disinfection of the wounds and surrounding parts ; but as the ordinary process of disinfection is, as has been said, insufficient, so the precautions taken did not come up to the degree actually required. Besides, when one or two cases of suppuration had appeared, circumstances forbade their being treated, as in hospitals, with isolation from other patients ; and the condition of the patients before they were admitted to the hospital, was not the same on board all ships.

When it happened on the Matsushima, that a large number of persons was wounded at one time, and the surgeries received damages, not a few medical materials being lost, the burn patients were just rubbed with vegetable oil used in the engine-room. It is plain that here antiseptic precautions were insufficient. With burns, owing to the extent of their areas, microörganisms are very likely to intrude not only from outside, but also from the skin, and suppuration can often not be avoided, even though sufficient antiseptic measures have been taken. Accordingly it was quite natural that these wounds should suppurate, the precautions taken being so imperfect : indeed most of them began to suppurate from the very beginning. Also, the dressing of burns requires much time, and the surgeons and nurses were too busy to give adequate treatment to other patients ; so the ship having been otherwise disabled, was sent back to Sasebo where the wounded persons were admitted to the hospital. This was after the lapse of three days and nights spent in the voyage, etc., and by that time the wounds were found already suppurating.

On the Hiyei, all the surgeons were killed, and all the nurses either killed or wounded, the medical materials were lost, and the wounded men could not properly be treated until the ship returned to the temporary rendezvous next day. Here at last they received for the first time treatment from surgeons, but they had to be transferred to another ship before proper treatment could be given because the ship had to hasten back in order to rejoin the fleet. Suppuration could not be avoided. The other ships cruised about in search of hostile vessels, on the day following the battle, and came back to the temporary station on the 3rd day. Here the wounded men were transferred to the transport Genkai-maru and sent back to Sasebo together with the men from the Hiyei. They numbered 66 in all. The Genkai-maru was not originally provided for transporting so many serious patients, but unfortunately the hospital ship prepared to meet such emergencies happened to be a long way off, and they had to avail themselves of the Genkai-maru. The ship had not sufficient room for the patients to lie down in, there was only one surgeon attached, and though four nurses from other ships were put on board the ship for temporary assistance, they had not a sufficient supply of surgical instruments and dressings and experienced no small difficulty in treating 66 serious cases, when even the simple precaution of isolating patients with suppurating wounds was impossible. The surgeons and nurses worked day aud night, but they were short handed. This was one of the weak spots in our treatment of the wounded.

In the battle of the Yellow sea, owing to the various circumstances just stated, it was unavoidable that the treatment of the wounded was not quite as satisfactory as had been expected ; but as ample provision had been made in Sasebo Naval Hospital the treatment after admission did not fall very far short of the high standard demanded. Though there were many patients whose wounds had already been suppurating, most of them recovered, only 9 persons succumbing to wounds in the hospital. But so many patients arriving at once, the resources of the hospital were taxed to their utmost extent, and for the first three or four days, the surgeons and nurses worked day and night, yet from the lack of time and hands, some wounds as the penetrating ones of the abdomen, which might have been benefitted if an operation had been performed at once, were left until it was too late.

In the attack of Wei-hai-wei, the number of the wounded on each vessel was very small, and as fortunately, the hospital ship was near, they were immediately placed under treatment, but notwithstanding this, among the serious cases many wounds suppurated. We must attribute this to the character of the injuries, and to the difficulty found in keeping a wound from the beginning perfectly clean, which proves that it is necessary to exercise still greater precaution in the treatment of wounds in question.

4.—GANGRENE.

It was mentioned in the last chapter that tissues around the wounds sloughed in very many cases, but those in which distant gangrene ensued were seen only in the following instances. The first was No. 270 clinical history, which was an injury caused by iron-pieces : a contused wound sustained on the front part of the lower end of the left thigh, in which though the patella and the lower end of the femur were comminuted, yet hæmorrhage was not heavy. On the next day, when resection of the knee joint was performed, no injury was recognised in the popliteal artery, yet at the time when the patient was admitted into the hospital, the circulation below the knee-joint was found to be arrested, the end of the foot already changed into a purplish colour, showing that the part had mortified. Accordingly, amputation was performed at the lower third of the thigh and the wound afterwards healed. The second was No. 288 clinical history : a case of a perforating wound caused by a shell-fragment at the upper part of the right leg, the tibia and fibula being heavily comminuted so as to open the knee-joint, accompanied by several wounds with loss of substance at the lower third of the thigh on the same side. The distal end of the foot began to present signs of mortification, and accordingly the thigh was amputated at the lower part, on board the Genkai-maru, but as this patient had sustained, besides those above stated, various serious injuries over the whole body, being struck by the explosion of an enormous shell, he succumbed to the wound a little time after the operation. Whether in this case the popliteal artery was completely or partially rent, or was heavily contused so as to produce emboli, we can not of course judge with certainty, for all the surgeons being killed at the time there was none who could tell about the condition of the hæmorrhage, but considering that the bones were greatly comminuted, we may reasonably conclude that the artery was rent completely. On the contrary, with the first case, hæmorrhage was slight at the time of injury, and no harm was recognised in the popliteal artery when operation was performed ; the iron-fragment hitting the part from the front, broke the bone without entering into the joint, so owing to the comminution of the lower part of the femur, the popliteal artery which runs closely to it was probably heavily contused, so that emboli was produced by degrees. Also, the front part of the knee being smashed by a contused wound, collateral circulation was mostly stopped, and for these reasons, probably gangrene sooner set in. There was a case which resembles the present one, but was healed without gangrene, that is No. 271 clinical history, in this case, a large contused wound was sustained in front of the right knee-joint, part of the patella smashed and the joint opened, but as the lower end of the femur received no injury, the artery seemed to have escaped harm. Next, case No. 224 clinical history, received a contused lacerated wound attended with fracture below the left elbow joint, thus tearing the bifurcation of the brachial artery, the patient also sustained a blind wound on the upper arm of the same side. When first examined in the hospital, the part below the forearm was found already gangrenous. Besides those above mentioned, No. 304 clinical history, received a contused wound attended with fracture on the left toes, the tips of which became gangrenous. This however, can not be numbered as an instance of distant gangrene. As the shell-wound compared with the bullet wound is much more serious, the former is more liable to gangrene. In the late war, of 256 wounded persons, instances of distant gangrene are three above stated, and each of them was caused by a main artery being injured together with more or less collateral branches ; in these cases gangrene was an inevitable result. Again with shell-wounds, sometimes a local gangrene occurs in the skin inflicted with contusion where at first no injuries were seen, yet after a time, a large slough is produced. But there was no such case in the late war, neither any gangrene so common in former wars and known by the name of inflammatory or septic, or hospital gangrenes.

5.—ERYSIPELAS.

The only traumatic infection occurred among the wounded men in the late war was erysipelas. The first was case No. 190 ; this patient received a blind wound below the spine of the right scapula on September 17th, and on October 12th, while he was in the Sasebo Naval Hospital, he was attacked by erysipelas, but fortunately being a slight case, it was cured on the 22nd following. The second was case No. 270, which owing to the gangrene of the left lower limb had, on September 22nd, the thigh amputated at the lower third, and when, on January 31st the next year, the stump was about to heal, erysipelas attacked him in the Kure hospital, but as it was a slight case, he recovered before long. The third one was case No. 192, which was a patient with a perforating wound attended with fracture, extending from the right scapula to the upper arm. Healing of the wound was much delayed and on February 27th the following year, temperature suddenly rose to over 40° ; the skin around the wound orifice became inflamed. In spite of all possible treatment, the inflammation gradually spread and the general strength failing day after day, he unfortunately succumbed to it on March 17th. It is true erysipelas developed in three out of 256 wounded, but they were all idiopathic and have no trace of infection to each other. There were numerous serious wounds, a large number of which, for reasons already stated, fell into suppuration, and healing proved very difficult, requiring a great many days of treatment in the hospitals, also a large number of surgical cases besides those wounded in battle were admitted, these facts combined made the hospitals overcrowded and would have led to development of erysipelas.

CHPTER VI.

MANAGEMENT OF THE WOUNDED.

1.—SURGERY IN THE SHIP.

The surgery of a ship ought to be conveniently placed for collecting the wounded from the various parts of the ship, and also in places least liable to be disturbed by hostile shells. In the men-of-war of former days as in the time of Nelson, there was a wide hatch extending vertically from the upper deck to the bottom, and below the water line which was admirably adapted, being in the centre of the ship, for spacious surgery—Nowadays this part is occupied by the engine room, coal bunks etc., leaving no room for the wounded. This difficulty is experienced now in every ship, the surgery must be placed at the fore and aft of the ship and consequently two are necessary, for it would be inconvenient to convey the wounded from one end of the ship to the other, especially so when the water-tight doors were closed, necessitating a very roundabout communication between the fore and aft of the ship. But, as in almost all ships, there was no room for a surgery at the fore or aft below the water-line, therefore places like the lower deck were chosen which is above the water-line, and not quite free from the intrusion of hostile shells, so it was the general scheme that two surgeries one at each end should be established. But some ships lacking room, had to be content with only one surgery. The Hiyei is an instance of this kind, and in the ship as already stated, the surgery which was established in the wardroom at the rear of the lower deck, was hit by an enormous shell which killed all the surgeons and others who happened to be there, or at least inflicted serious wounds, and also destroyed nearly the whole of the surgical instruments &c. In the Matsushima, two surgeries were established, one on the upper deck of the fore part, and another on the waist of the lower deck, both were destroyed by shells and the explosion of ammunition; and at this time the chief surgeon of the fleet was seriously injured, and some of the wounded persons then receiving treatment were killed; this caused also a great loss of surgical instruments &c. In the Yoshino, one of the surgeries which was placed in the ward-room at the rear of the lower deck, was twice struck by hostile shells, but luckily no one was injured except a nurse who sustained a slight wound. We see therefore that any part that is above the water-line, is not free from the danger of being struck by shells and is of course unfitted for a surgery ; but in the absence of room below the line, there is no alternative but to be content with what is obtainable. In order therefore to facilitate the conveyance of the wounded, and avoid a wholesale catastrophe like that experienced in the Hiyei, it is prudent to have two surgeries, but this division has also its disadvantage for dividing the surgeons, nurses, and surgical implements that are anyhow limited in number and quantity in every ship, affords much inconvenience in treating many wounded men at the same time. In naval battles, sometimes fifty or sixty are wounded at a time and in one place. Supposing this should occur in the fore part of a ship, the wounded will naturally be brought to the surgery in that quarter ; and the surgery is suddenly overfull and short handed ; although only urgent measures of relief are taken during the fight, yet even then it is impossible to pay proper attention to all the wounded. At the same time, the medical attendants in the other surgery may have nothing to do, and yet they are not able to help each other which is a hindrance to successful treatment. For instance, the treatment of the wounded man (No. 143 clinical history) discussed in the chapter on hæmorrhage, where hæmorrhage was recognised to be heavy at first. If there had been then only one surgery and consequently two surgeons in it, one of them probably would have had time enough to enlarge the wound orifice, remove the pieces of smashed bone, and examining the condition of the artery to apply a ligature to it. But the surgeons being separated, one of them could not spare much time to a single patient, and accordingly such an insufficient method as applying a compress to the wound orifice was resorted to. The fact that many other wounds afterwards suppurated, was probably greatly due to the impossibility of giving any thing more than temporary relief at the first. This separating of the surgeries may be unavoidable, but it is necessarily attended with great drawbacks; if a single surgery could be placed in the middle of the ship where persons wounded at varrious parts could conveniently be collected, and at a place below the water-line least exposed to the danger from shells, it might then be called a suitable one. As was already discussed in the last chapter, the character of wounds, and conditions in ships during the battle, were all so unfavorable that unless managed most carefully and strictly, the wounds could hardly escape suppuration, and even the whole of the medical attendants in one place would not have proved sufficient, therefore, the disadvantage of dividing them is too obvious to need further argument. Places appropriated for a surgery or surgeries in respective ships are as follows:—

The Yoshino—Starboard side in the fore part on the lower deck; and the ward-room, in the after part on the lower deck.

The Naniwa—Ward-room, in the after part on the lower deck.

The Takachiho—In the fore part on the lower deck; and the wardroom, on the lower deck.

The Akitsushima—In the fore part on the lower deck.

The Matsushima—Sick berth in the fore part on the upper deck; and the mess-room in the waist of the lower deck.

The Itsukushima—Sick berth in the fore part on the lower deck; the gun-room in the waist on the lower deck; and the reception room in the after part on the upper deck.

The Hashidate—The store-room in the fore part (below the water-line); the warrant officers' room in the waist on the lower deck.

The Fuso—The warrant officers' room in the fore part, (below the water-line); and by the engine-room in the aft (below the water-line).

The Chiyoda—in the waist on the lower deck; and the ward-room on the lower deck.

The Takao—The stokers' room in the fore part on the lower deck; and ward-room.

The Kongo—In the fore part on the lower deck; and the gun-room in the aft.

The Hiyei—Ward-room in the aft on the lower deck.

The Tsukushi—In the fore and after parts on the lower deck.

The Oshima—The cabin in the aft on the lower deck.

The Akagi—The cabin, in the aft on the lower deck.

The Chokai—In front of dispensary in the fore part on the lower deck.

The Atago—In the fore part on the lower deck.

The Maya—The cabin in the aft on the lower deck.

The Tenryu—In the fore part on the lower deck; and the cock-pit in the aft (below the water-line).

The Kaimon—Ward-room in the aft on the lower deck.

The Musashi—Sail room in the fore part under the lower deck (below the water-line); and the ward-room.

The Katsuragi—Carpenter's store in the fore part (below the water-line); and the after cock-pit (below the water-line).

The Yamato—Fore part on the lower deck; and the ward-room.

The Amagi—In front of dispensary in the fore part on the lower deck.

The Banjo—In front of dispensary in the fore part on the lower deck.

The Tsukuba—Fore part on the lower deck; and the ward-room.
The Yayeyama—Ward-room in the aft on the lower deck.
The Saikyo-maru—Fore part on the main deck.

As above stated, places appropriated by the respective ships were not the same, and some parts although dirty and narrow and quite unfit for surgery, were made use of, as there were no better places. This was an unavoidable outcome from the construction of certain ships, but considered from a surgical point of view, it must be regarded as a gross defect. In ships with three surgeons a question may arise, how they should be allotted to two surgeries, whether the larger number be advantageously placed in the fore part or in the aft. This must be determined according to the size of the respective surgeries, and their convenience for the collection of the wounded. However, as is plain from the 6th and 15th tables in chapter III, the comparative numbers of the wounded in the fore and the aft are anything but certain, as might be expected. That the total number of the wounded in the fore part was by far larger than that of the aft, was because a large number happened to be wounded in the fore part of the Matsushima.

2.—CONVEYANCE OF THE WOUNDED.

Apparatus for the conveyance of the wounded can no more be uniform in size and construction than ships can. Various kinds had been provided for use on board, one like an easy-chair, net hammock, Macdonald's or Gihon's stretchers, etc., and the men had been drilled beforehand in their use. But during the actual engagement, it was found that stretchers of all kinds were cumbrous and troublesome, and of very little use for the speedy conveyance of a large number of wounded to the surgeries, during the noise and confusion of the battle. Hands alone were therefore employed on board the ships, and the stretchers were laid aside. Conveyance by hands alone, is prompt and convenient, even if there be many wounded persons at one time; for every man that is uninjured can generally be useful for carrying wounded men; and so during the actual battle, our men were obliged to resort to this method. But even then a seriously wounded person, requires the assistance of 3 or 4 men, to get him up or down stairs, and there is always a great deal of confusion in the removal; also, in the conveyance of patients who have sustained fracture or extensive burns, this method certainly aggravates the injury; and, from this point of view, carrying on stretchers is by far the better. We have still a great deal to learn about the conveyance of the wounded on ships, but it is a *sine qua non* that some handy way like the bare hand method must be resorted to, at the time of actual engagement, and therefore ships' crews should be also drilled in this method of conveyance.

After the battle, in transferring the wounded from one ship to another, and similar cases, the bare-hand method is not needed; for the wounds have by this time been properly treated: splints and bandages have been applied; and there is time enough to lay the patients comfortably upon stretchers. On such occasions, field and other stretchers on which the wounded person could lie full length were made use of; the patients were let down by means of pulleys and sent out through hatches or port-holes, without the slightest hitch.

3.—TREATMENT OF THE WOUNDED.

In regard to the treatment of the wounded, we have already stated, that at first only urgent and temporary measures of relief were taken, such as to wash the insides of the wounds, to disinfect the surrounding skin, to extract foreign bodies when they could be easily seen and removed, to staunch hæmorrhage, by compression or torsion, and in case of a fracture to apply splints. This is inevitable during battle, when little individual care can be given to the patients : when the battle was over, proper treatment was accorded in the order of the urgency of the respective wounds. At the time of the second treatment, the wounds were again disinfected within and around, any foreign body that was recognised by exploration was removed, splints that were found not to have been properly applied were renewed, and so forth. The battle of the Yellow sea, was not however, finished before night fall : the darkness combined with the utter exhaustion of the crews, made the subsequent treatment extremely difficult. The principal antiseptics used in ships for irrigation of wounds and other similar purposes, was a solution of carbolic acid, 2.5—3 per cent, sometimes supplemented by a sprinkling of iodoform. To wounds in the eyes, chest and abdomen, a solution of boracic acid was chiefly used. For dressing materials, corrosive sublimate gauze, carbolic acid gauze or absorbent cotton wool were employed, with linseed oil paper and bandage applied over them. The splints used were all made of wood. For gypsum bandage, which is very inconvenient for use on ships during action, wooden splints proved an efficacious substitute. As notwithstanding the great attention paid on each ship to the washing of wounds with antiseptic solution, the process was, as was said in the last chapter, not enough to prevent the wounds from suppuration, it is plain that stronger measures should be taken with shell-wounds. It is true that shell-wounds are extremely disposed to suppuration, that the conditions on board ships during action were likely to soil wounds ; and besides, the surgeries were all in unsuitable locations. These were unavoidable circumstances, but there are still other points to which further attention should be called. With shell-wounds sustained in parts covered with clothes, a soiled piece of cloth, is very frequently found remaining within, and there were not a few cases in which these foreign substances were taken out in the hospital, to which the patients were admitted many days after injury. This must have been one of the causes which promoted suppuration, and great care should be taken to examine the wounds well with the finger lest such foreign substances be left behind; for as the inside of the wounds is very irregular, the cloth pieces can not be washed out by mere irrigation with an antiseptic solution. Again, we have seen that, on account of the loss of vital function, the wound surface can not resist even a few micro-organisms, if once admitted. The surrounding tissues should therefore be strictly disinfected, care being taken at the same time that the disinfection should cover a larger area than that which is protected by dressing materials. The inside of the wound can not be expected to be perfectly cleansed during the confusion of fighting, so if the quantity required be not so large as to cause poisoning, a solid antiseptic like iodoform may conveniently be sprinkled into the wound. Next, materials for dressing may be preserved with care, but as many days must necessarily elapse before they are actually used, and as their absolute purity can not be assured, there is a need of having on each ship some handy apparatus for disinfecting them immediately before use. It is a fact too well known to need mentioning here, that every thing that touches the wound should be clean; still it is well to insist on it once, for fear it should be neglected in the confusion of future actions. The greatest difficulty that was experienced in the way of treatment, was the management of patients suffering from extensive burns over the body.

Not to mention that much time was required in changing the dressings, the sufferings of patients while being washed with antiseptic solution were extreme. Lastly, on one ship, it happened that owing to the loss of surgical dressings &c., and the consequently insufficient application of antiseptics, the burns soon suppurated. This is another point on which we have to pursue further investigations. The chief antiseptic that was used in the hospitals, was a solution of carbolic acid, sometimes of corrosive sublimate, and of boracic acid, also iodoform in a very few instances. The dressings were made to be always sterilized before use, and at the same time great care was taken with antiseptic precautions, yet it was not an easy matter to eradicate the suppuration of the wound, and consequently the course of the wounds was generally slow, and a comparatively large number of days was required for treatment. As was shown by No. 21 table in chapter III, the number of days' sickness was 15,880 for 254 wounded persons, which is the total of the days' sickness both on ships and in hospitals. This gives a ratio of 62½ days for each wounded man. If 27 patients who died from serious wounds within 3 days after injury, and 17 patients who were cured within 3 days as their wounds were slight, be subtracted, and the days of sickness for the remainder be counted, the average for each patient will become 2½ months which shows that the number of days' sickness was strikingly high in the late war. This is because the nature of a shell-wound is different from that of other wounds and is very hard to cure. Ten soldiers from the army who had received bullet wounds in the Pescadores were admitted to the Sasebo Naval Hospital, and we treated them in exactly the same way as the other patients, and took the opportunity of comparing the respective curability, of bullet and shell wounds. We found that there was a striking difference between the two, even when the wounds were quite alike in their outward appearances. In the hospitals, we resorted to the conservative surgery as much as we could: amputation or resection for compound fractures or injuries to the joints was avoided whenever possible: and this treatment was mostly attended with favorable results. The only cases in which amputation was performed were 3 :—No. 270 clinical history, in which the lower part of the left thigh was amputated; No. 224, for which amputation of the middle part of the left arm was performed, and No. 261, in which the upper part of the right thigh was amputated. The last of these died after operation. For the lotion of burns, solutions of carbolic acid and boracic acid were employed; sometimes powders or ointments of boracic acid, iodoform and salicylic acid ; but it was found extremely difficult to keep the wounded parts clean. Great pain was complained of at the time of changing the dressings, which were accordingly renewed as rarely as possible. But as it happened to be the hottest season of the year, maggots were frequently produced under the dressings, which had then necessarily to be renewed pretty often in spite of the pain. With the purpose of preventing the sticking of dressings to the burned surface, the part was first washed, then fenestrated oiled paper was placed on it, with gauze or cotton wool put over it. But this proved to be unsatisfactory, for the discharge would accumulate under the oiled paper.

CHAPTER VII.*

DISEASES AND INJURIES.

(EXCLUSIVE OF THE 371 KILLED AND WOUNDED BY THE ACTIONS DURING THE WAR).

The mean daily force in the service for the 481 days of the Japan-China war, which beginning on July 25th, 1894 and ended on November 17th, 1895, was 14,260. The number of the cases of disease and injury returned for this period was 6,050, of which 4,075 occurred among the men sent abroad, and the remaining 1,975 among those at home stations. If we classify these according to their ranks 652 cases belonged to petty officers, 5,384 cases to men, and 14 cases to employés. The total number of the days' sickness was 217,960. The number of patients admitted to hospitals was 2,193, and the number of their days' sickness was 109,219. The total number of cases recovered was 5,253, of which those recovered at hospitals numbered 1,680. The number of deaths was 172, of which the deaths at hospital was 112. Cases invalided were 106, of which 13 were petty officers, and 93 seamen. Cases remaining unrecovered at the time of conclusion of the war, were 519, of which 295 were at hospitals (for details see the table showing the number of cases of disease and injury).

The above show an average daily number of 453.14 men sick in the service of our Navy, which is in the ratio of 31.78 per 1,000 of the force. If now we compare the number of patients during the war with the average number of cases during the five years previous to it, we shall have the following results :

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* Chapter VII was written by the translator of this history.

	Average of the preceding five years.	During the war (481 days.)	
Average number of men sick daily...	339.40	453.14	
Ratio of cases per 1000 of force ...	37.17	31.78	
Average number of days' sickness of each case	32.72	36.03	
Ratio of the invalided per 1000 of force	9.76	7.43 or 5.63	If proportioned for one year.
Ratio of deaths per 1000 of force ...	7.78	12.00 or 9.10	as above.

THE FOLLOWING TABLE SHOWS THE RESPECTIVE AVERAGE NUMBERS OF DAILY NEW CASES THAT OCCURRED DURING THE WAR, AND THE PRECEDING FIVE YEARS.

Disease and Injury.	Average number of daily new cases for five years previous to the war.	Average number of daily new cases during the war.	Ratio of daily new cases during the war in comparison with the ratio in time of peace	
			Increase	Decrease
Constitutional Diseases.	1.704	1.262		0.442
Diseases of the Nervous System...	0.112	0.158	0.046	
Diseases of the Respiratory Organs.	0.843	1.108	0.265	
Diseases of the Circulatory Organs.	0.084	0.091	0.007	
Diseases of the Nutritive Organs.	0.878	1.295	0.417	
Diseases of the Urino-Genital Organs.	0.419	0.586	0.167	
Venereal Diseases	3.092	4.501	1.409	
Diseases of the Eye.	0.524	0.387		0.137
Diseases of the Ear.	0.710	0.890	0.018	
Diseases of the Integuments. ...	1.055	1.073	0.018	
Diseases of the Locomotive Organs.	0.072	0.212	0.140	
Injuries.	1.390	1.742	0.352	
Diseases and Injuries of other classes.	0.054	0.073	0.019	
Total...	10.301	12.578	2.277	0.579

From this table, it will be seen that the numbers both of cases and of days' sickness during the war show an increase as compared with the preceding five years. This increase is attributable partly to the hard duties in which the force had to engage during the war, and partly to the increase of the total force which resulted from the calling up of the first and second reserves. However, it shows a decrease of cases in the ratio of 5.40 per 1,000 of force, when compared with the preceding five years and this decrease may justly be accounted for as a proof of our force having been full of patriotic spirit. When the war was once declared, the whole nation was roused to enthusiasm ; and this enthusiasm manifested itself especially in the forces on active service, who forgot everything in their indignant loyalty and public spirit, so much so that they refused to take rest or submit to medical help, not only when slightly ill, but so long as their mind and body could well afford to endure.

The ratio of deaths per 1,000 of the force for the period of the war exhibits an increase of 1.32 in comparison with that of the preceding five years. But every war ever fought has uniformly shown that deaths from disease are far more frequent than those consequent on wounds received in action. Notwithstanding this acknowledged fact, the total number in our force of men, who died from injuries received in action was 150, while those who died of disease and injury during the same period were 172, giving the ratio of 10.51 per 1,000 for the former, and 12.00 per 1,000 for the latter, which ratios we can see do not present any remarkable difference. This can only be attributed to the minute and elaborate attention paid to sanitary matters by the authorities concerned, which prevented contagious diseases from making any great headway.

Let us now refer to the histories of famous wars in the nineteenth century at large, and look into the losses of life incurred in them.

In the Walcheren expedition, England had 1.67 of her troops killed, and 34.69 carried away by disease ; Spain lost 8,889 men killed by the enemy, and 24,930 men by disease, out of a total of 61,511 men. In the Crimean war, the French had about 20,000 men killed, and 75,000 lost by disease, and England lost 4,067 men killed, and 17,580 men through disease. In the Anglo-French expedition against China, out of the 30,000 troops despatched there, 601 men were killed in action, while 4,758 men died of disease. In the Russo-Turkish war, the Russians lost 36,455 men killed, and 83,446 men through disease. During the Mexican war, among the American forces the killed were 1,180 men, as against 4,925 who died from sickness. With our army in the present war, out of 227,600 soldiers engaged, 1,005 men were killed in action, while 15,860 died of disease. The proportions above enumerated between the numbers of the killed in action, and those who died from sickness all refer to armies, and therefore can not appropriately be adduced in comparison with figures referring to navies. But our purpose is only to prove the fact that in any kind of war deaths from disease are far more numerous than deaths in action, and that therefore, we may justly claim that the almost equal ratios above demonstrated between these two classes of loss in our Navy during the present war, must be attributed to the creditable services rendered by the authorities concerned in sanitary matters.

1.—INFECTIOUS DISEASES.

The total number of infectious diseases during the Japan-China War (July 25th, 1894 to November 17th, 1895) was 420, of which 319 were on the field of war, and the remaining 101 at home stations. Besides the above, there was a certain number of cases of this category occurring among civilian employés, but some of the men having been discharged before the diseases had run their course, we are not able to give any conclusive statements about them. Yet as the numbers of cases occurring among these men will often be mentioned, the reader is warned not to confound these cases with those actually belonging to the Navy. Now to particularize the said cases, in the field occurred:—Enteric fever 50, cholera 49, dysentery 55, malaria 124, measles 4, and influenza 37. At home:—Cholera 40, enteric fever 21, dysentery 16, malaria 22, measles 1, and varioloid 1.

As for the terminations, in the field :—Enteric fever, 36 recovered and 14 died ; cholera, 26 recovered and 23 died ; dysentery, 52 recovered and 3 died ; malaria, 116 recovered and 8 died, measles and influenza all recovered. At home stations :—Cholera, 14 recovered and 26 died ; enteric fever, 17 recovered and 4 died ; dysentery, 14 recovered and 2 died ; malaria, measles, and varioloid all recovered.

(1) ENTERIC FEVER.

At the present day, enteric fever exists sporadically in every country : no locality limits it, nor does any climate refuse it. And during an expedition, provisions of different kinds, especially drinking water naturally are liable to fall short of the required quality and quantity, compared with those supplied in the times of peace ; and this seems to be one of the great causes for the breaking out of the disease in question. The mean daily force abroad for the said war was 9,250, of which 50 persons were attacked with the disease—that is, 0.5 per cent which was no increase over that at the time of peace. With the men at home stations 21 persons out of 5,009, the mean daily force, were affected with the disease, which showed a rate of 0.4, and this was again a very small number. As has been mentioned, this disease exists in almost every country, and the proportion between the number of cases and the population may naturally differ according to various causes. However, according to a report furnished by Zuelzer of the number of cases that occurred in 5 years among 10,000 people of all classes in Berlin, the rate per cent was 0.446, which is equal to that of our force at home. Therefore, we may safely assert that the cases of this disease in our navy was not at all increased on account of the war. The following table showing the rates of cases that occurred in our Navy during 14 consecutive years will prove that the foregoing statement is correct.

ENTERIC FEVER

Year.	Cases.	Ratio of Cases per 1,000 of force.	Average number of day's sickness of each case.	Recovered.	Died.	Ratio of deaths per 100 of patients.
1886	21	2.50	51.38	12	9	42.86
1887	40	4.39	68.88	36	4	10.00
1888	48	5.23	54.54	43	5	10.42
1889	23	2.57	60.78	15	8	34.78
1890	69	7.57	57.33	55	14	20.29
1891	51	4.99	56.86	42	9	17.64
1892	80	8.21	54.99	56	24	30.00
1893	53	5.69	48.43	40	13	24.52
1894 war time	36	3.27	53.22	27	9	25.00
1895	59	4.54	47.17	41	18	30.50
1896	116	8.89	55.74	94	22	18.96
1897	144	9.62	46.16	126	18	12.50
1898	128	6.95	50.88	108	20	15.62
1899	119	6.09	44.35	97	22	18.48

It is an unhappy fact experienced by every nation, that forces sent on an expedition suffer much from the prevalence of this disease ; which fact we learn from late reports as well as former experiences. But on the contrary, we had in our Navy, during the war, no more cases than usual. This happy result, we are very glad to say, must really be attributed to the particular attention paid by medical and other officers concerned, and to the fact that the men faithfully observed the instructions given them with regard to sanitation.

Investigating into the causes of the cases, which we had, it was ascertained that they were mostly of scattered nature ; the paths of infection were uncertain though it was evident that the causes existed outside of the Navy. The seasons at which the disease appeared were chiefly in Summer and Autumn and the persons affected were all young. The ratio of deaths which was 25 to 30 per cent appears to be rather high, but this can not be said to be unreasonably great, for during an expedition the proper treatment of the disease is often hampered by various circumstances.

However, when a case broke out, no matter whether it was on board or on land, the place did not fail to undergo a thorough disinfection ; and not a single case occurred of further infection in the Navy circle itself.

Much to our regret, however, at the end of the war, an epidemic of enteric fever broke out on board the Yamato, as this, in reality, occurred after the end of the war, only a part of the cases were included in the number of those already enumerated, but for the sake of explaining their course, a report furnished by the surgeon will be stated here. The Yamato is a vessel built at the Yokosuka Shipbuilding Yard, Japan, in 1885, having a displacement of 1476 tons ; a corvette, iron-frame, clad in wood. She had a complement of 228 men, who had always been healthy, and so many cases of enteric fever had never occurred before.

Reports on personal observations of Fever on board the Yamato

by surgeon K. Koyano.

The Yamato weighed anchor on the 23rd August, 1895 at Yokosuka Bay, and touching at Tateyama, Matoya, Ebukuro, and Nagasaki, entered Kagoshima Bay on the 4th of September. Here she stayed 5 days, and on the 9th following left the port; on the 10th she cast anchor in the bay of Kuji in Emi-Oshima; on the 12th following again weighing anchor, she arrived at Keelung, Formosa on the 15th, the crew were all the while healthy. However, on the day before her arrival—that is, on September 14th, while the ship was passing off the Yayeyama Isles, one of the seamen was attacked with febrile symptoms. Under quinine, his temperature took the course as shown in the No. 1 chart and returned, after 11 days, to its normal state, the man being able to resume his duty on the 16th day from the beginning of his illness. On September 20th, the ship left Keelung, and owing to bad weather, after lying at anchor 17 hours and 20 minutes off the coast of Amoy, arrived at the Pescadores on the 22nd. Here she took up the duties of defence and reconnoitering, meanwhile plying several times between Anping and Takau. All this time the crew were healthy as usual. But unfortunately on the 1st of October, one of the seamen was attacked with febrile symptoms, his temperature took a course as shown in No. 2 chart, and on the 6th day of illness, the crisis began. In another week, he returned to duty. On the 7th following, a new case appeared, and the temperature took a course as shown in No. 3 chart. Many cases of febrile symptoms now occurred, and a regular administration of quinine was tried in the ship, and from October 7th, every individual was ordered every other day to take 0.3 gramme of quinine. This did not however prove effective and each day saw new cases occur. Therefore, from the 30th, quinine was given daily. Even messengers to the shore and landing parties carried the medicine with them, so that they might not be interrupted in its use. This was tried until the 12th November, but successive new cases made us feel that the effect of the drug was doubtful so the use of the medicine was suspended, and chief attentions were paid to hygienic measures, such as ventilation of the ship, cleansing and drying of clothes and beddings, prohibition of lying bare while sleeping, etc., under strict supervision, and also disinfection of the evacuations of patients; great care was also paid to the water closets. Still new cases continued to appear as before and what was worse, on November 20th, just a week after the suspension of the quinine the number of new cases began to increase day by day. The administration of quinine was again resorted to, and probably owing to this measure new cases now began to decrease gradually.

Most of the cases in question presented very irregular remissions, and it was very rare that characteristic symptoms were regularly shown. In a word, many of them were cases of a pernicious remittent type. The temperatures of some cases as in charts Nos. 3 and 5 bore no great resemblance to enteric fever, though this is what they were; but so long as they were treated on board, presented no such symptoms as stupor, rosy spots, tenderness of right iliac region, nor brownish tongue; the abdomen also was collapsed with constipation and the skin was moist with perspirations. Indeed, there were cases in which pain in the abdomen was complained of, but it was not localized, and came violently with paroxysm, so as to appear like renal colic. Again, there were cases in which the fever remained stationary for 6 to 10 days from the very beginning, and would then return after a critical perspiration to normal state, spontaneously or after a single trial of an antipyretic. And though, after from 6 to 12 hours, the temperature rose to its former high degrees, yet there were no symptoms of hæmorrhage from the bowels, nor collapse. There were also some cases in which the temperature would rise by degrees at first, and then without any persistence directly fall by a quick descent and end in recovery. These patients were all sent home by home bound transports and admitted into the hospitals; therefore the true nature of the cases could not be known until a patient who was sent home, and admitted to Yokosuka Naval Hospital was diagnosed as having enteric fever on the 26th October, the report of which reached the ship on November 22nd. Though in consideration of the symptoms above mentioned, most cases were called remittent fever, yet as there was a suspicion that they might be cases of enteric fever, strict attention was paid as to management of the patients to preventive measures, and to disinfection. From the very beginning, the water-closets used by the patients were strictly set apart, and those cases which closely resembled enteric fever were isolated from the rest their evacuations being disinfected every time by the nurse with a 5 per cent. carbolic solution. Also after the patients had been sent home, their hammocks, etc., were disinfected with the same carbolic. There were two patients who showed nervous symptoms, of whom one was sent to the Army Hospital at Keelung, and the other, during the voyage home, on November 29th, slipped away from his nurse and threw himself overboard. The number of febrile cases from October 1st to December 5th, and their terminations are as follows :—

Ranks.	Cases.	Recovered.	Admitted to hospital.	Died.	Summary.
Petty officers	2	...	2	...	The 8 recovered and the 3 died were those treated on board the ship. One of the latter in consequence of mental derangement threw himself into the sea and was drowned.
Seamen	39	8	28	3	
Stokers...............	11	...	11	...	
Smiths...............	2	...	2	...	
Carpenters	2	...	2	...	
Chief steward	1	...	1	...	
Barber...............	1	...	1	...	
Total	58	8	47	3	

Patients who were sent to hospitals at home, and those who died on the way home, were as follow :—

1.—Two stokers, one smith, were sent to the Yokosuka Naval Hospital by the Saikyo-maru on October 26th, and the two stokers died on the way.

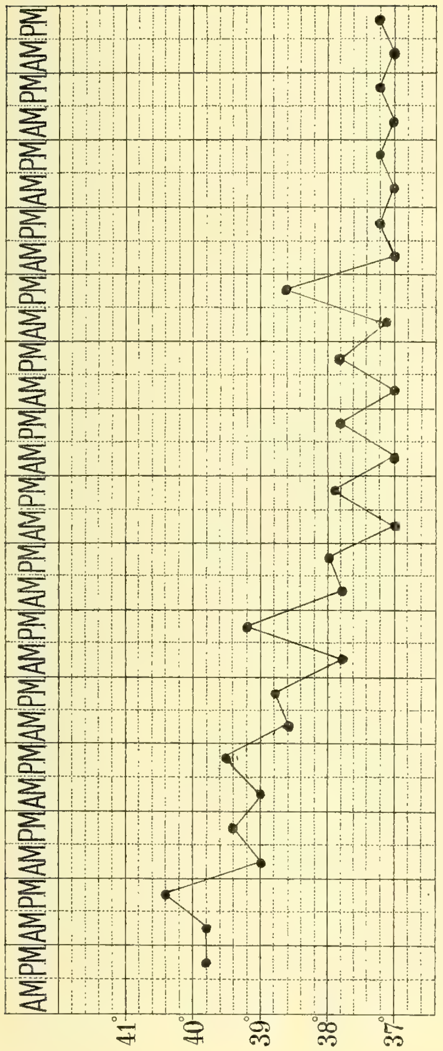
2.—Two seamen, four stokers, two carpenters, were sent to Sasebo Naval Hospital on November 6th, one stoker died on the way.

3.—One seaman, five stokers were sent to Sasebo Naval Hospital on board the Kōnoura-maru on November 22nd. On the way, one seaman died.

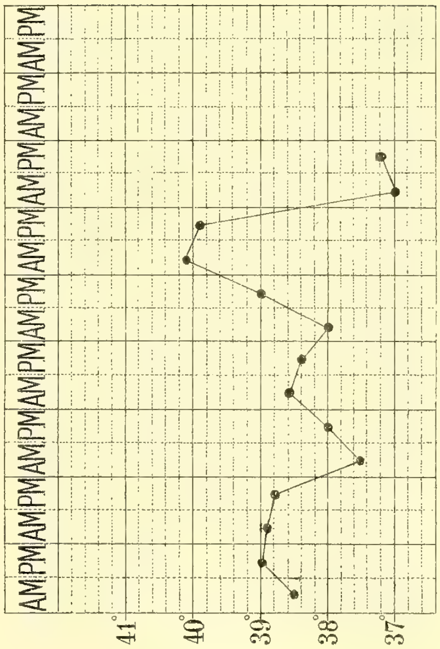
4.—Eight seamen, two stokers, one smith, one carpenter, and one barber were sent to Army Hospital at Keelung.

5.—One petty officer, twelve seamen, two stokers, one carpenter, one steward were sent to the Sasebo Naval Hospital.

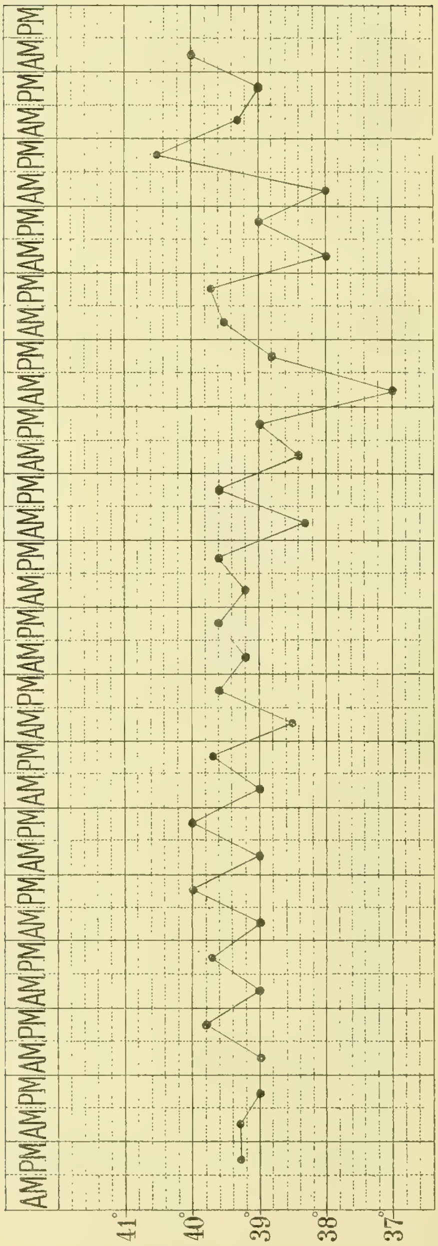
Charts showing the temperature of the respective cases. (The temperature of the said cases, though somewhat complex, may be classified into the following 12 varieties.)



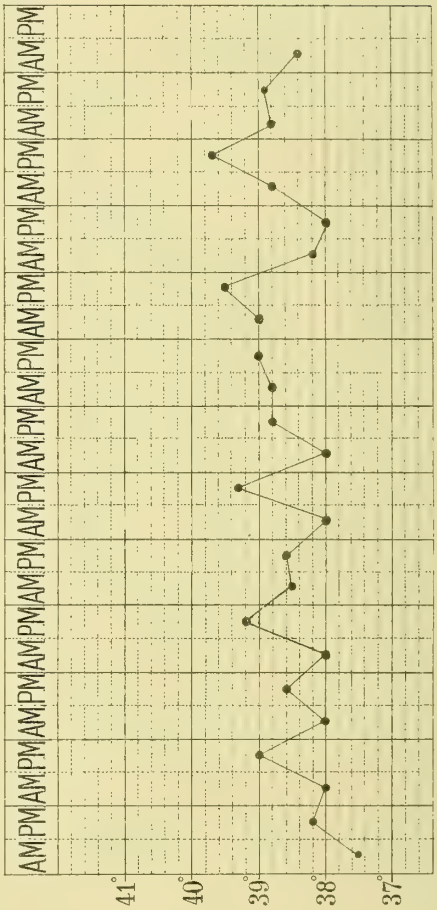
No. 1 CHART (8 cases of this type).



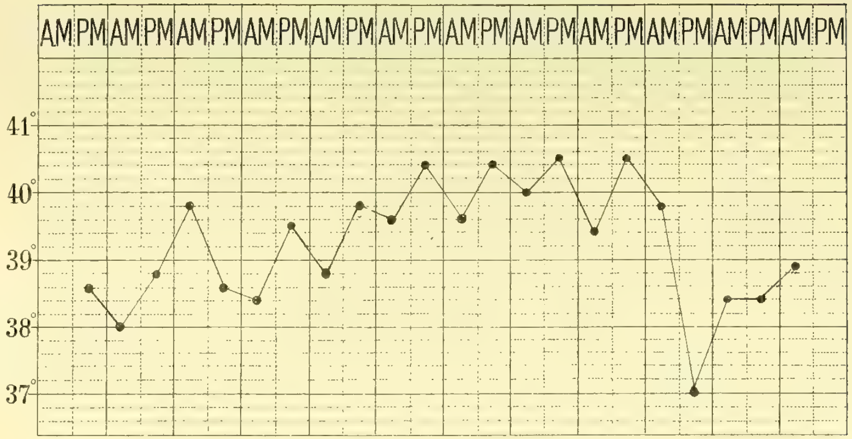
No. 2 CHART (3 cases).



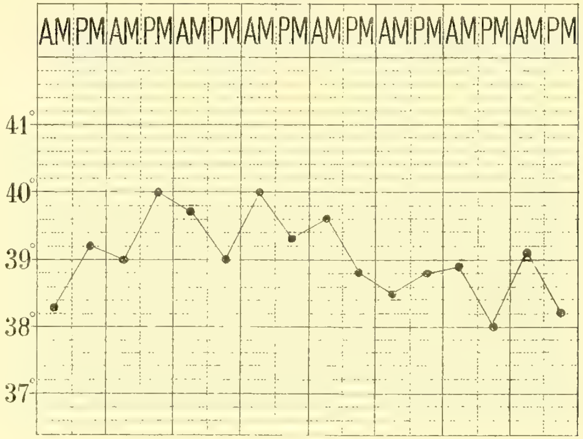
No. 3 CHART (one case, terminated fatally).



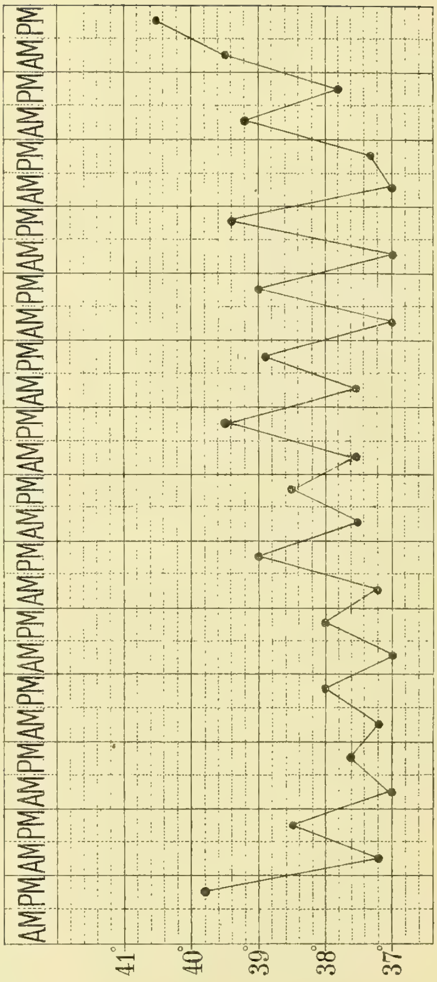
No. 4 CHART (4 cases).



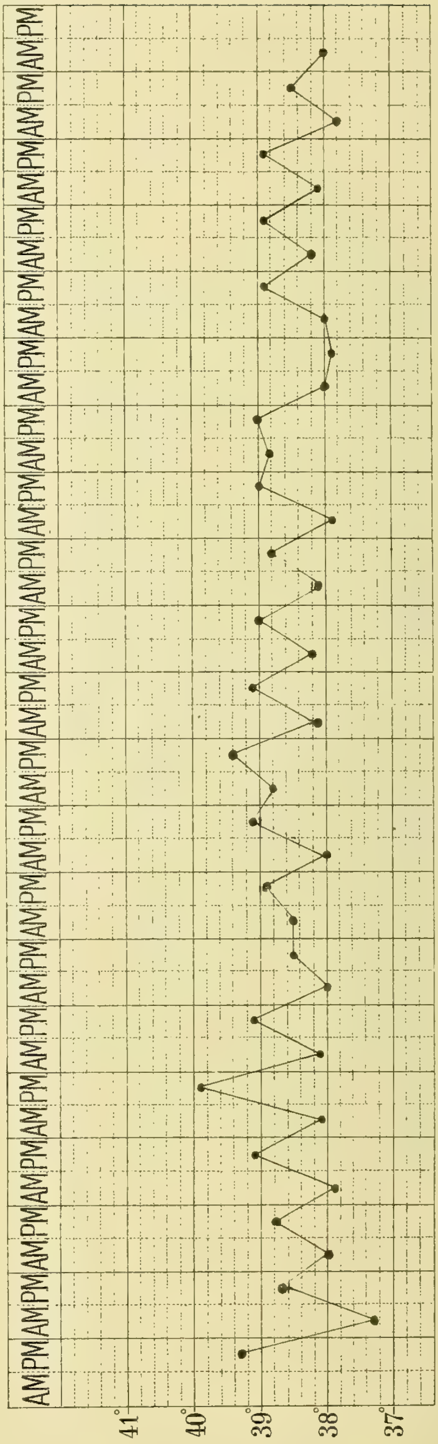
No. 5 CHART (10 cases).



No. 6 CHART (7 cases).

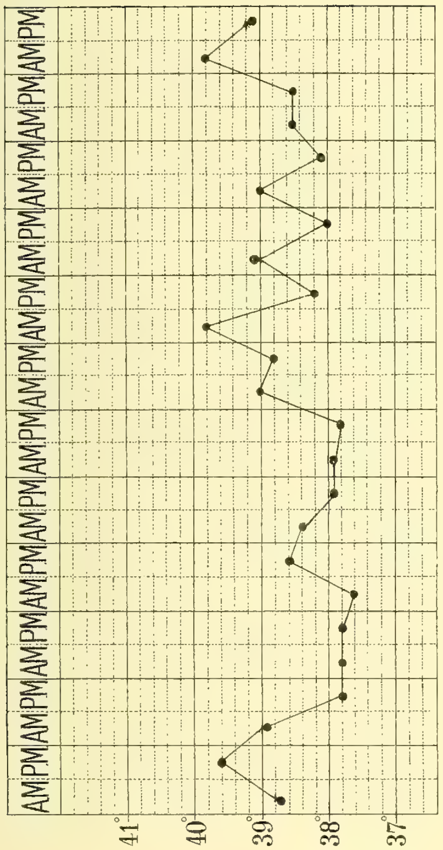


No. 7 CHART (6 cases of which one died).

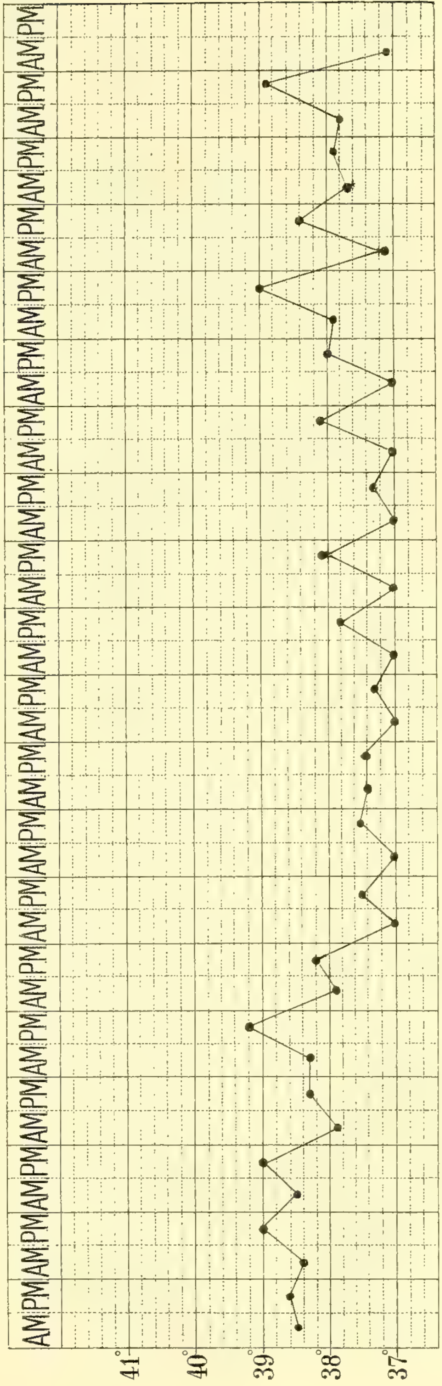


No. 8 CHART (4 cases).

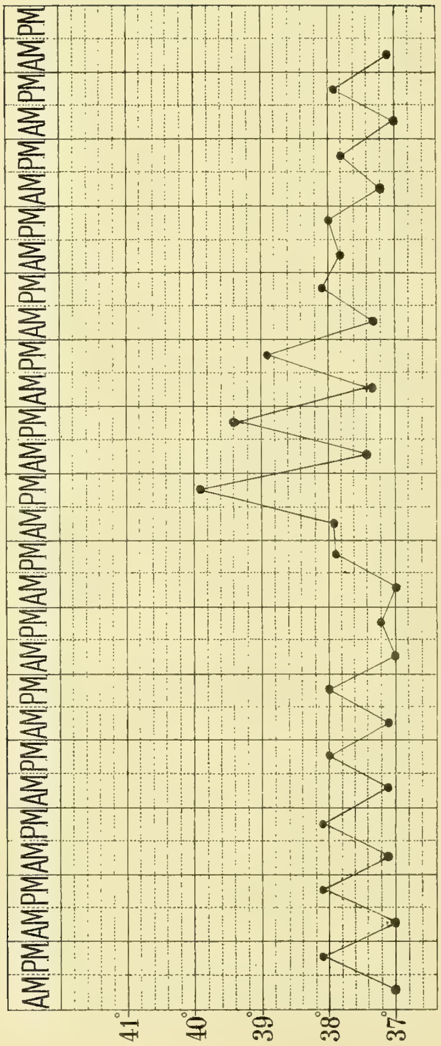
No. 9 CHART (4 cases).



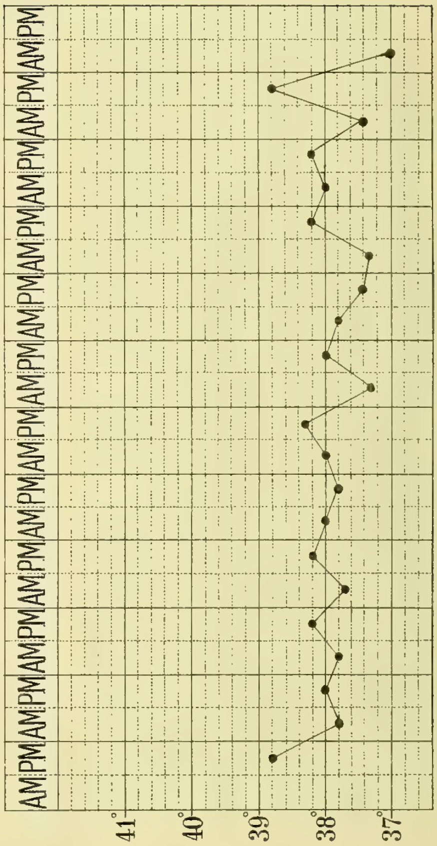
No. 10 CHART (6 cases).



No. 11 CHART (3 cases).



No. 12 CHART (2 cases).



It is often the case with fevers and especially with infectious diseases that their origin can not be traced. The fever under consideration was especially difficult to diagnose, as it was not attended with the typical symptoms, but was very ambiguously complex.

From the time of leaving the port of Kagoshima on September 9th, no person on board the ship went ashore until the 5th December, excepting the landing party that occupied Takau on October 15th, and some official messengers. It is true that the ship took in drinking water at Kagoshima and Oshima. But at these places, no sooner had the ship arrived than inquiry was made as to the state of the local health, which was found to be quite satisfactory. As to the nature of the water taken in, only a qualitative examination was made, but there could be no reason for entertaining any doubt about the wholesome nature of the water, for at Kagoshima, the water was not only the source of supply to the inhabitants, but to all vessels that call at the port. At Oshima the water was obtained from the reservoirs kept for the special use of the ships belonging to the Navy. Besides, the entire water taken in was spent in 3 days, from which date only distilled water was used. As regards provisions, they consisted almost entirely of preserved meats, and it only rarely happened that chickens, eggs, vegetables, fruits, etc., were purchased from the natives of Formosa. These were chiefly in demand among the officers, the seamen receiving only a pittance of fresh meat and vegetables, and that but once in a long while. Thus notwithstanding the fact that the whole crew on board lived in the same place and took the same water, all the officers were quite free from the disease, the only sufferers, with the exception of 2 petty officers, being men. We are convinced that this was probably in part due to the nature of their occupations, and in part to the lack of ability to take care of themselves. The first patient in the No. 3 temperature chart occurred later than October 7th, and the first case in the No. 5 chart, later than October 15th, and considering that they had not gone ashore after the ship's having weighed anchor at Kagoshima, we must suppose that these patients were infected in the latter place if we are to accept the presumption that it was enteric fever. (The first patient in the No. 7 chart had had an attack of enteric fever in June of the same year, he recovered in the following August). Granting this to be a case, the incubation period is too long. From the investigation carried on with regard to the landing party at Takau, among 73 persons (3 officers included), 21 were attacked by the disease, but seeing that there were cases among the crew who did not set their foot on the shore before or after the landing of the said 73 persons, there is no reason to assert that the disease was introduced into the ship through the medium of the landing party. And also, search was made to ascertain if the infection had any relation, with coming into contact with the patients, or with the condition of ventilation, yet nothing to that effect could be discovered. Shall we then assume that the disease was brought on board the ship by the wind from the land where malarial fever prevails as an endemic, this is not probable. For, in fact, this ship, having the duties of reconnoitering and defence from the beginning in Formosan sea, made frequent voyages along the coast of Formosa and the Pescadores, consequently she was moved about more than other ships in the same quarters. But if we consider that no cases of disease occurred at all on board many other warships and vessels which were harbouring in the same ports, it is certain that the disease did not have its source in the wind. In fact in the Yoshino and Akitsushima, there occurred at one time several cases of remittent fever, but they were directly extirpated. As has been said above, not only was the origin of the epidemic a mystery, but all preventive sanitary measures proving inefficacious, the Captain of the ship convened the chief surgeons of the other ships to hold a consulation on the disease, and accordingly Surgeons Terajima and Okamoto, Assistant-surgeon Ishizuka met in the presence of the Captain. After deliberate consultation, we came to the conclusion that the present epidemic was a complication of intermittent and enteric fever. This conclusion was arrived at chiefly on the ground that one of the three patients who had been sent back by the Saikyo-maru to the Yokosuka Naval Hospital was returned as enteric fever and two having died on the way voyage and the nature of the fever was such as shown in the No. 5 temperature chart. This conclusion was presented to the Captain attended with the following memorial in the names of Surgeons Terajima and Okamoto.

" Sir :—Having been asked to hold a consulation about the preventive measures against the fever in your ship, we have the pleasure of laying before you the result of our deliberations. In preventive and hygienic measures concerning the daily life of the crew, we think there is nothing left undone by the chief surgeon of your ship, but should the disease not abate, and continue to appear as it is, we consider that there would be no alternative to be adopted for your ship than to return home and undergo thorough disinfection."

Also, as urgent requisites, the following measures were notified to the Captain, which were directly put into execution.

1.—All water used for washing &c. should be well boiled.

2.—The water-tanks should be cleansed thoroughly.

3.—Dishes and other utensils should be washed with boiled water.

4.—Patients suffering from any febrile symptoms should be placed in an isolated place.

5.—Quinine should be given to the healthy crew for a time.

6.—The bilge shall be thoroughly cleansed.

7.—Disinfection of the water-closets with lime should be done more strictly.

I myself had entertained suspicion of the bilge as stated in the No. 6 item, for a comparatively large number of patients was found among the stokers, but at the tmportant time of the war, being on the duties of defence and reconnoitering, we had even while at anchor to keep fire and put on watches, there was therefore no time to cleanse the bilge. Availing ourselves therefore of a ship bound home, I had sent a quantity of the bilge-water to the Sasebo Naval Hospital for examination. And also the water in the ship's tanks that had been made use of were sent to the Hospital for the same purpose.

After the 24th, the items resolved upon, were carried into practice as far as possible, yet pressed by the urgent necessity of returning home to undergo disinfection, the ship made preparations for sailing back. By this time, materials for disinfection having fallen short, the 2nd and 6th items could not sufficiently be carried out; for the 2nd object the tanks were cleansed with boiled water, and for the 6th the closets having been washed were sprinkled with lime. The ship weighed anchor at the Pescadores on the 28th November, and encountered the monsoon of the Formosan straits, which being pretty strong (even during her stay at the Pescadores, the scuttles could rarely be left open) the ship inclined over at an angle of 30 or 40 degrees. Probably, owing to this, even patients in a convalescent stage showed a rise of temperature, and consequently we had to leave 13 serious cases at the Keelung Army Hospital. On December 2nd, the ship steamed out of Keelung port and ateered for Sasebo. Strange to relate, on and after the next day, that is, December 3rd, the patients on board the ship generally began to improve. This probably had much to do with the change of climate. She arrived at Sasebo on December 5th, ind 17 febrile patients were directly sent to the Hospital. Hereupon I submitted to she Captain the following views about disinfection.

1.—Half the crew at a time shall take a bath, and their clothing be disinfected with steam.

2.—Clothes, books, and other articles (chiefly articles belonging to officers above warrant officers inclusive) shall be sprinkled with 20 per cent carbolic solution, and dried.

3.—Clothing belonging to the crew shall undergo steam disinfection together with the sacks.

4.—Bedding, curtains, and carpets shall undergo steam disinfection.

5.—Things kept in stores shall be taken out to a fixed place, and be exposed to the sun.

However, weapons, navigation instruments, and such stores shall be excepted.

6.—The water-tanks shall first be painted with a 10 per cent lime-solution, which is to be wiped off after 24 hours, and then a quantity of water being poured in, if the water does not present alkaline reaction after 24 hours, the tanks may be put in use.

7.—The upper and lower decks, kitchens, bilge, and closets shall also be painted with a 10 per cent lime-solution, which is to be washed off after 24 hours.

8.—Walls and ceilings of the habitable parts of the ship shall be wiped with cloths dipped in a 20 per cent solution of carbolic acid, and be dried.

9.—Store rooms, having their contents taken out, shall be sprinkled on their walls with one in 1,000 corrosive solution and be dried.

10.—After these measures, strict observation will be kept for 2 weeks whether any cases of the disease occur again.

For the purpose of having the above steps carried out, the ship was ordered on December 6th to proceed to the Nagasaki quarantine station. Following is the report on the condition of the ship's disinfection.

On December 6th, 1895, the Yamato arrived at the Mekami quarantine station in Nagasaki and quarantine officers came on board the ship, and consulted about the disinfection of the ship. We were told that the office then had not enough hands for carrying on the thorough disinfection of a warship, and that also the men were not well acquainted with the method of disinfecting a ship's bottom and water-tanks. Accordingly it was agreed that the places most difficult for the process should be taken in hand by our own crew, and the rest come under the charge of the office. At 9 a.m., on the 7th, half the hands of the ship landed to undergo disinfection, they carried with them, clothes-bags, utensils, hammocks, luggage, shoes, &c., and at the same time they carried lunch with them. Meanwhile, disinfection was commenced in the ship. The ward-room was sprinkled with a five per cent solution of carbolic acid, and the decks, ceilings, walls, tables and chairs, etc., having successively been wiped with cloths dipped in the same solution, and then left to dry in the room closed. Over the doors, were stuck bills written "disinfected," and the passage of people not yet disinfected was prohibited. All the officers' rooms and passages were disinfected in the same way. Pending disinfection, those officers who had not yet undergone the process, were placed in the gun-room, and a passage on the port side was left for them, petty officers and men who had not yet undergone the process were placed on the upper deck of the port side (sentinels and boys had their clothes, hair, caps, and shoes sufficiently sprinkled with carbolic solution). The process of disinfection in this way having made progress, the fore part of the ship where petty-officers and men used to sit and sleep had to be disinfected. Here the deck and other parts were pumped with a five per cent. carbolic solution so that deck &c. was soaked with it, then the scuttles being opened, the part was left to dry. Next, the deck leading to the stores at the bottom, and stair cases thereto were disinfected. Hereupon, the fore part of the lower deck was shut off, and a bill of "disinfected," was stuck on the entrance. Now those who returned after undergoing the disinfection were made to arrange things in the disinfected rooms. Then the upper deck on the starboard side, starboard ladder and the hummock nettings on the upper deck were disinfected for the use of the disinfected persons. As to the water-closets on both sides, urinals were likewise pumped with the same carbolic solution (the evacuation pipes were too small to permit lime-paste without the fear of obstruction). The carbolic solution was first poured into the closets, and then painted with a 10 per cent lime-paste. One closet on the starboard was once appropriated to the use of the fever patients, accordingly no admittance was given for 24 hours after disinfection. Closets on the port side were open to the use of the disinfected.

At 1 p.m., the work was resumed, gallant forecastle, poop, the cabin were all treated with carbolic solution. At 3 p.m., the disinfected returned to the ship to change with those to be disinfected. So the latter now took with them articles like those already mentioned, and landed to receive disinfection. Now, the remaining gun-room, passage to it, the upper deck and port ladder etc., underwent the process; and the closets were again disinfected, for they had been visited by the non-disinfected. Finally the engine-rooms were sprinkled with carbolic solution. Thus the work to be performed by the quarantine officers now came to an end. It was just 5 p.m., so eight hours had been spent in the work. Two quarantine officers and the ship's surgeon superintended the process, which was carried on by 7 disinfecting-men assisted by 5 seamen. The medical materials spent were about 120 gallons of 20 per cent carbolic solution, about 24 gallons of 50 per cent carbolic, and about 3 gallons of lime paste. The places that were disinfected by the ship's hands were the water tanks, stores, and the ship's bottom. First, a certain number of the non-disinfected men were instructed to wipe their bodies clean, and then to put on working-garments that had already undergone steam-disinfection; and then to carry the articles in the stores to the places already disinfected. All having thus been cleared out, the walls and ceilings of the stores were painted with 10 per cent lime-paste. The lime-paste was quite dry after 3 hours, and then the said articles were taken back, this time by men already disinfected.

As regards the water tanks, they were first emptied; then painted with 10 per cent lime-paste, which after 24 hours was scrupulously washed off. Then they were filled with well-water, which after 24 hours was found to have only a slight trace of lime. The tanks were accordingly made use of.

As for the bottom of the ship, all the sections had their bilge water scooped out; and every part was painted with 10 per cent lime-paste. In this case, the lime was left without being wiped away. After the process was over, every nook was carefully inspected. The hands required in disinfecting the tanks were 8, and 6 for the bottom, and the lime spent on the occasion was 8 cans (petroleum cans). Those who worked at the tanks had to strip themselves in order to get into them with the thermometer at 43° F., and they felt a shuddering cold. So spirits were given them to prepare against cold. Those who were engaged at the disinfection were themselves disinfected after the work.

Lastly, as to the water-closets, it was resolved that they should be painted with lime-paste thrice a day for two weeks by sick-berth stewards. The cases already mentioned having been found to be enteric fever, the ship's crew were strictly forbidden to go on shore for two weeks, this being the average duration of the incubation. And it was also resolved that should a febrile case occur, no matter what its nature was, slight or serious, the patient should be sent to the hospital, and the hammock, clothes-bag, and other articles belonging to him, receive steam-disinfection; and that the place which the patient used to occupy be disinfected with a 1 in 1,000 corrosive sublimate solution.

After this thorough disinfection febrile cases ceased completely and the ship resumed service.

(2) CHOLERA.

Japan is unfortunately often ravaged by epidemic cholera. 1894 was luckily a very healthy year, the cases of sporadic cholera throughout the country during the year being only 546. On the other hand in May of the next year when our troops were returning home from China, reports to the effect that the troops and coolies on the expedition had been attacked by cholera reached the central government, and caused the utmost consternation. As soon as this report was received the Home and the War departments set to work with zeal, omitting no measure for quarantine and prevention. The virus however, notwithstanding all efforts was disseminated throughout the land : the number of cases amounting to 55,144, of which 40, 154 resulted in death. In the army, the total number of patients was 9,658, of whom, 2,365 recovered, and 5,991 died, while the remaining 1,300 odd cases having been, for some reason or other, transferred to other departments not be ascertained with accuracy.

In our navy, there occurred during the war 89 cases, of which 49 were abroad and 40 at home stations. Besides these, there were 55 cases among the employés and mostly among the men engaged with the transports in the service of the naval station at Port Arthur. During the service abroad, the Omi produced the largest number of patients, that is, 13 cases ; the Kaimon 7, the Matsushima 6, the Sai-yen, Banjo, and Kongō each 3, and there were several other ships and torpedo-boats which had only 1 case each. The Places at home which were infected with the disease were mostly on land that is, 10 patients each at the Yokosuka naval barracks and the Sasebo defence mine station, 9 at the Kure naval barracks, 4 at the Sasebo naval barracks. Besides the above, there were several places each of which produced only a single case.

The Cholera that thus attacked our navy was an unavoidable consequence of the general prevalence of the plague through the country, and the causes of its contagion were always traceable outside the navy quarters. The period of the appearance of cholera under question extended from January to November 1895, of which the months of July, August, and September produced the largest number of patients.

(A) To write about the beginning of the said prevalence of cholera :—one of the wounded soldiers who was sent home by the transport Tateyama-maru, which started from Port Arthur on the 1st January, 1895 to the Kokura army hospital exhibited violent diarrhœa and vomitings on the night following, and at last died on the 3rd following. The male nurse who attended the above patient also had violent diarrhœa on the night of the 4th, succumbing to the attack on the 5th. This was the first public report of disease with diarrhœa and vomiting during the expedition.

(B) Secondly, at about 1 a.m. on January 18th, one of the employés of the Transportation and Communication Department of the Army at Port Arthur, was, all of a sudden, seized with bellyache and violent vomiting and diarrhœa, and died of collapse on the 19th following. Again, at about 1 a.m. on the 19th, a coolie in the employ of the Navy was seized by the same symptoms, which resulted in death on the afternoon of the 20th following.

The cases above mentioned were apparently genuine cases of cholera, but probably on this occasion owing to a thorough disinfection and preventive measures having been taken, the disease ceased without further spread. It was however a matter of no little regret that other urgent business prevented the surgeons from making a thorough bacteriological examination of the cases at the time.

(C) On the Hōkoku-maru that entered Port Arthur on

February 5th from home many patients appeared suffering from diarrhœa and vomiting. This ship was originally a foreign trade-ship which was purchased by a Japanese merchant during November of the preceding year, and after undergoing more or less repairs, was chartered as a transport in the service of the Army, the present voyage to Port Arthur being her first trial in her new service. She had on board soldiers and coolies numbering 150, and horses to the same number. It was on February 2nd, during her voyage to the said port that a patient was attacked with vomiting and diarrhœa, followed successively by new patients to the number of 11, before she had reached her destination on the 5th; and the cases had increased to 35 by the 8th following. Of these 35, two died before entering the hospital, and three after admission ; the persons affected were not limited to a certain class, but troops, coolies, and ship's crew were alike sufferers from the disease. It was all but certain that the cause of this outbreak was to be found in the ship itself. For, other persons belonging to the same companies and placed on three other ships were entirely free from any affection having symptoms of vomiting and diarrhœa. It naturally follows that the cause was in the ship, and did not exist before the passengers went aboard. However, fortunately by means of strict measures of disinfection, the disease was confined to the ship and did not spread.

(D) Among the soldiers and coolies of the Army that were removed from Wei-hai-wei to Port Arthur from the end of February to the beginning of March, there were many cases of vomiting and diarrhœa. This however, happily ceased by March 20th, without spreading at all.

(E) On March 19th, at Moji, Japan, a case of cholera was reported, and another at Ujina on the 28th following. These two places had each a Commissariat Department, and were centres of transportation.

(F) On April 9th, among the coolies that were sent straight to Port Arthur from home, there was one who was affected with diarrhœa and died on the ensuing day. Upon this occasion, the disease was at length considered to be true cholera, and isolation of suspicious patients being strictly enforced, the outbreak of the disease in the said group of coolies was extirpated ere long. From this time however, the troops landed from transports were all succesively affected with the disease, so much so that it was finally propagated among our troops stationed in the Liao-tung Peninsula. Meanwhile, it had commenced to increase in virulence at home, Osaka, Hiroshima, Hyogo, Toyama, and Tokyo being the cities that produced the greatest number of patients.

(G) In February, 1895, when our fleets had destroyed the Chinese Northern Squadron, our Army with a view to keeping Southern China in check organized a mixed brigade, and despatched it to the south to occupy the Pescadores. On this occasion, the troops were conveyed by several transports under the protection of a fleet. During the voyage, on March 23rd, 1895, some of the soldiers on board the transport Kagoshima-maru were attacked with cholera, and after their landing at the Pescadores which were speedily occupied, the disease spread among other soldiers, and finally raged for some time with very disastrous results.

(H) When, in May 1895, the island of Formosa was to be delivered to our government, some of the troops sent to occupy it, were, on their way thither, attacked with cholera, and subsequently it broke out among the soldiers and coolies landed at Keelung and Taipeh, where it raged with violence from the end of June to the end of July following.

What we have now stated is chiefly a summary of the cholera epidemics that occurred in the Army and among the coolies attached to it, and of the dates of its general prevalence at home. It may seem that this had no direct relation with our Navy, but at the time of an expedition, the army and navy have on most cases to act as one body, assisting each other. For instance, at the landing of troops, the navy affords them assistance ; transports belonging to the army have naval officers of superintendence on board accompanied by signal-men ; and after the occupation of Port Arthur and Tahlien bay all affairs concerning the harbours were taken into the hands of the navy; and consequently such business as establishing a quarantine station for soldiers and coolies in transport belonging the army naturally came under the duties of Navy Surgeons as well as of those in the Army.

Where did this cholera originate? This was a great question at that time, and after minute investigations, the surgeons of the navy and army unanimously came to the conclusion that the germs having first existed in transports chartered by the government, at last made their appearance far and wide, and that it was anything but true to say that the disease had originated in any district in China. This is the more undeniable when we consider that the Chinese were quite free from cholera at that time.

In a word, at the time of this expedition, those persons who were first affected with cholera on board the transports, fell sick, some while in the ships, others, after landing; and they subsequently spread the disease among the soldiers and coolies at Port Arthur and Tahlien bay, whence it was again transplanted to centers of conveyance at, home, such as Moji and Ujina. Again, from the last named placest the disease spread on one side into the interior, and on the other to the Pescadores and Formosa in the south, probably conveyed on board transports in which troops were sent. The total number of cholera cases in the Empire during 1895 amounted to 55,144, of which

40,154 or 72.82 per cent. perished. This was the most serious epidemic of cholera we had for five years.

One ship in which cholera broke out more or less as an epidemic was the Omimaru. While she was lying at anchor at Keelung, Formosa, on July, 1895, two cases of pseudo-cholera appeared on board. The patients were immediately sent ashore and kept isolated, and the ship was subjected to strict disinfection; but in spite of all the efforts made to extinguish the disease, new cases continuously broke out, some of them resulting in death. So it was resolved that the ship should return home to Nagasaki and receive a wholesale disinfection. In this case the disease was perhaps introduced during her stay at Keelung, for at that harbour, she lay at anchor surrounded by transports belonging to the army, in which many cases of cholera occurred from time to time. In the Kaimon 7 cases occurred. In the case of this ship, while it was at anchor at the Pescadores, great care was taken to prevent the entrance of the disease by shutting of all communication with the outside as far as possible, for the disease was prevalent among the soldiers and troops on land. However, as one of the principal duties of this ship was the survey of the adjacent seas, it was impossible entirely to stop communication with the land, and consequently she was also infected with repeated cases of the disease, though by dint of strict observance of disinfective measures, the officers and crew were able to keep themselves in health without seeing a great prevalence of the epidemic.

The Matsushima had 6 cases, each of which occurred separately after a long interval, and it was evident that each was affected at an infected harbour. Accordingly, perfect measures of disinfection being adopted each time a case broke out, the disease was kept in abeyance, and the health of the ship was not injured. There were 55 cases among those who were not of the proper force of the navy; 29

were coolies employed at the naval station of Port Arthur, and most of these got the infection from affected coolies belonging to the army.

Some ten cases occurred in each of the naval barracks at home, which we should say, were a natural consequence of the general prevalence of the disease throughout the country, for they had all been exposed to various mediums of infection. It was rather creditable to the authorities concerned and the persons belonging to these localities that notwithstanding the intrusion of the disease into such crowded places, it was kept under control by effective measures of disinfection without producing numerous patients. The cholera cases that occurred in the Navy numbered 144 altogether, and the rate of death was 55.05 per 100 of cases.

(3) DYSENTERY.

Dysentery also is very prevalent in our country from year to year. In 1894 the total cases of this epidemic that occurred through the land reached to the great number of 155,140, of which 38,094 resulted in death. In 1895, the number was 52,711 of which 12,959 terminated in death. This was a great decrease to that of the preceding year. During the war, the army produced 13,009 cases, of which 4,591 recovered, and 1,662 died, and 6,739 were either sent to other jurisdictions or could not be traced for some reason or other, and 17 cases were still remaining when the report was made.

In the navy, the sufferers from the disease were 71 men, 35 coolies employed at the naval station at Longreach in Korea and 20 coolies in the service of the Port Arthur station. Of the above patients, 30 cases occurred on board the ships, and the largest numbers on a single ship were 8 in the Fuso ; 5 in the Matsushima, 4 in the Ōmi. On other ships, there happened no more than 1 or 2 cases, so that they could never be said to be a prevalence of the sickness. The only place that showed any state of prevalence was the naval station of Longreach in Korea.

The following is the abstract of a report by the Chief Surgeon of the station. The Longreach station was one temporarily set up at the north-western end of the Shinchi island in the south of Korea. On August 20th, 1894, the officers, men and coolies attached all landed at that place, erected tents, and then were engaged in planning schemes of defence. On August 31st, a coolie named Suyekichi Otsubo applied for medical relief saying he was suffering from diarrhœa. On examination, he was found suffering from dysentery, and his intestinal evacuations being inspected, it was seen to contain some blood. Hereupon, he was placed in an isolated room, the water closet visited by the patient was thoroughly disinfected, all his evacuations burnt and perfect measures of prevention adopted. The patient was sent home on September 4th to Sasebo on board a transport. Again on September 8th, two seamen and one coolie were affected with the disease, followed by one more coolie on the 9th. These four men applied for medical help for the first time on the night of the 10th following. They were diagnosed as suffering from dysentery, so they were also isolated. A suitable spot was now selected, and an infectious ward commenced on the morning of the 11th, being completed on the following day. 11 cases of dysentery were at once removed to the ward, for sufferers had increased to that number, as the 11th produced 2 more patients among the seamen, and 5 among the coolies. Water-closets numbering 19 in all were each well disinfected, and the bowel evacuations in them taken to a distant place and buried. At the same time it was resolved that disinfectants should be liberally sprinkled over the closets every day. On the 13th following, 2 coolies fell sick, and on the 14th 1 seaman and 3 coolies.

On September 15th, the serious cases among the coolies—10 in number were sent back to Sasebo. After that up to the 24th of the same month 4 cases among the seamen and 12 among the coolies appeared. Happily, most of them being slight cases recovered within a week. Again 6 coolie patients were sent back to Sasebo on the 24th. Until the end of September every day now saw from 1 to 4 new cases either among the seamen or coolies. But in October, the force of the epidemic gradually abated, and the patients that appeared on November 14th was the last one, as no new case appeared after that. The patients sent back to Sasebo after September 24th and until the time of extinction of the disease were 9, all the rest having recovered in the station.

From the advent of the disease till its final disappearance, there occurred 60 cases of dysentery among the members of the naval station in Longreach—that is, 5 officers, 20 seamen, and 35 coolies. They were generally slight cases. The slightest ones, after two or three bloody evacuations recovered in 6 or 7 days. Of the serious cases, two of seamen who were sent home to the Naval Hospital at Sasebo, completely recovered in a month. The coolie patients with whom the disease lingered for a long time were sent back to Sasebo and dismissed there, so the results in their cases could not be ascertained, but considering the general condition of other patients, it may safely be said that all of them finally recovered.

The said naval station in Korea was established at the foot of a hill 1075 feet high, situated at the north-western end of Shinchi island, and the ground made a natural slope towards the sea. For this reason, almost all buildings for dwellings, such as barracks, sick wards, kitchens, sheds for coolies, etc., were constructed in fields which were quite dry and well drained. Thus, in point of soil, every thing was quite satisfactory. As for drinking water, a big well being dug, the water was conducted to wooden tanks each ten tons in capacity by means of buried pipes, and from the tanks water was drawn up with pumps. Moreover, as the water was very excellent in quality, it could not be regarded as affording any cause for dysentery.

In time of war, naturally temporary dwellings could not be regarded as perfect, for the floors were made of straw mats laid on the ground, with canvas roofs under which the occupants sat and slept. But the utmost care possible in war time was taken with a view to their health. The provisions consisted of biscuits, rice, tinned meats, and nothing else, so that we could not consider their food as having in any way contributed to the production of dysentery. However, as it was the beginning of cool autumn, the bedding of the coolies was too poor to keep them warm enough, and they were thus exposed to chills. This may have been the predisposing cause of the disease. There existed a few cases of intermittent fever among the coolies, but there was no reason to consider the place as a malarial district.

As has been stated, the naval station under consideration was situated in the fields distant from the dwellings of the native inhabitants among whom also there existed no case of dysentery, so the disease that prevailed among our men could not have been introduced from the natives. The only probable cause was found in the following fact. The coolies that assembled at the said station—over 600 in number—chiefly came from Saga, Nagasaki, Kumamoto, Fukuoka, where dysentery prevails more or less every year. Among them, there seem to have been some who had been latently affected with the disease which appeared after their arrival at the station. Hence the propagation. Comparatively the largest number of patients were found among the last batch of coolies—100 in number—sent by Ichimura & Co., that arrived on September 1st from home.

Besides the said prevalence, there were 26 cases of dysentery that were admitted, in the course of the next year 1895, to the hospital at the station of Port Arthur. To name them in order of time: 1 man in February, 2 coolies in April, 1 artisan in May, 2 coolies in June, 5 coolies in July, 2 officers, 2 seamen, 1 band-man, 4 artisans, 1 stoker, 2 coolies in August, 2 coolies, 1 nurse in September. But they were only sporadic cases in the course of many months. Of these, only 1 resulted in death, and the rest recovered.

(4) MALARIAL FEVER.

During the period of the war, there occurred, in 1894, 30 cases of malarial fever, and 116 cases in the following year. According to the districts of their infection, they may be divided into three different classes: those infected in Korea or China, those in Formosan districts, and those affected at home. It is a certain fact that the districts along the sea-coasts of Korea and China are malarious. When the war commenced, most of our war-vessels assembled at Kakuon island on the western coast of Korea, the gun-boats lying at anchor close by the shores, and even landing their crews for various business purposes. When Port Arthur and Wei-hai-wei had been taken and the war came to an end, a gun-boat like the Chokai sailed up the river and anchored at Tientsin, where more than 10 of her crew suffered from malarial fever. The types of malarial fever that prevail in China and Korea are various, and their comparative frequency is difficult to ascertain, yet the quotidian and tertian, seem most frequent.

A case of quotidian fever:—S. Hori aged 18, a cook on board the gun-boat Maya. During the time that she was cruising about Sensui bay, Chemulpo, Caroline bay and Gyo-into on the western coasts of Korea, the man began, on September 12th, 1894 to feel chilliness and headache. He thought it a mere cold and did not ask for medical help. Then every evening about 6 o'clock, chilliness, headache, with lassitude of limb set in, followed by rise of temperature and sweating, all of which disappeared in the morning, with a slight headache remaining. On the night of the 17th, the symptoms became aggravated and his sleep was disturbed. On the following morning, he applied for medical advice for the first time. He was found to have an excellent constitution and pretty good nutrition; the pulse was full, and counted 86 per minute; temperature 102.°4 F.; thirst and loss of appetite; the abdomen was somewhat distended but no gurgling nor tenderness, stools twice a day; respirations 20 per minute; no cough nor expectoration, and no abnormal physical signs in the chest. The hepatic and splenic areæ presented no change; during the paroxysm, there was severe chilliness and headache; the face turned pale with general shivering; followed by fever and perspiration. The case was diagnosed as a quotidian fever. He was ordered to take rest, and 1.5 grammes of quinine was administered at 2 o'clock in the afternoon. From that time, the temperature kept at normal during the forenoon, but every evening it rose to 102° F., and though the shivering of the paroxysm also abated, yet perspiration was as profuse as ever and wetted his night-shirt. On the 20th, the dose of quinine was increased to 2.5 grammes a day. In consequence of this, the paroxysms abated, and the temperature indicated 101° F. After this, all the symptoms became favorable, but the tongue was furred, the appetite decreased, and the body became weak. A stomachic mixture was therefore administered, and the quinine was reduced to 2 grammes, after which the paroxysms were lessened, day by day, and there was a return of appetite and bodily strength. So on the 6th of October he was ordered to resume light work, and the quinine was again reduced to 1 gramme. On October 15th, he completely recovered. (Report of Chief Surgeon of the Maya.)

A case of Tertian fever :—K. Kitajima aged 23, seaman of the gun-boat Chokai. The ship, was in the seas of China and Korea from July, 1894, and in 1895 was staying for many months at Tientsin for its defence. While there, on the afternoon of the 24th August, 1895, the above named man was suddenly attacked with chill, followed by rise of temperature and perspiration. On the 25th, he had only headache and no chill nor rise of temperature or perspiration. On the afternoon of the 26th, chilliness came on followed by fever and sweat. On the morning of the 27th, the patient had headache and languor, so applied for medical advice. On examination, he was found to have a pretty good constitution; the temperature normal, the chest presented no abnormal physical signs, the spleen was found enlarged, the tongue was furred, appetite diminished. Accordingly, a mixture of dilute hydrochloric acid was given. On the afternoon of the 28th, chilliness set in, followed by rise of temperature to 103.° 2 F. Six hours previous to the next paroxysm, one gramme of quinine was given, which proved to be a preventive of the paroxysm. Before the time of the next paroxysm quinine was again given. On September the 2nd, the paroxysm made no appearance, and the patient felt himself greatly refreshed with return of appetite. Thus he completely recovered. (Report of Chief Surgeon of the Chokai.)

A case of quartan :—H. Akitomo aged 32, petty officer of the gun-boat Maya. While the ship was lying at anchor at Kakuon island, Korea, he was, at 4 p.m. on the 13th August, 1894, suddenly seized with headache and rigor, followed by rise of temperature, perspiration and giddiness. His countenance presented signs of distress, the cheeks flushed, the forehead sweating; the pulse was full, 98 per minute; the temperature indicated 102.°8 F; the whole body was immersed in sweat which drenched his clothes. The tongue was slightly furred, stools normal, no cough nor any expectoration; the chest physically presented no abnormal signs. He was ordered to bed, and diluted muriatic acid drink was given, and the head was cooled. About 11 o'clock in the night, the fever began to abate leaving some languor and headache. The temperature fell to normal. The case was diagnosed as a malarial fever, and at 1 p.m. the 14th, one gramme of quinine was given, by which he was able to sleep that night without any rise of temperature. No paroxysm was felt on the next day; the temperature kept normal, with only a slight headache. About 5 p.m. on the 16th a slight chill came again, when the temperature rose to 101° F., enough to be noticeable to the patient. However, it began to fall about 11 p.m. leaving headache and languor. On the 17th, all the symptoms abated, and from that time he had no further paroxysms and recovered entirely.

A case of remittent fever:—Y. Nindo, a seaman aged 19 belonging to the gun-boat Maya was seized while cruising along the western coasts of Korea, about 5 p.m. on September 4th, 1894 with symptoms of languor of body, headache and fever, which were said to have aggravated so much as to disturb his sleep. On the 5th, the patient was first seen when his face was flushed, and presented a look of distress. The temperature indicated 38.°4 C; the pulse was full, 76 per minute; the tongue was clear; appetite lost, with thirst; the abdomen was distended being soft but without gurgling or tenderness. Bowels moved regularly once a day, respirations 20 per minute; no cough nor expectoration. No abnormal physical signs in the chest. Headache, dizziness, and chill came and went, attended with fever and perspiration. Rest was ordered, and a muriatic acid drink was given. On the evening of the 5th, the chills appeared at short intervals accompanied with violent headache. The temperature rose to 40.° 5 C. On the forenoon of the 6th following, the temperature showed 38.° 2 C, which rose to 40° C. in the afternoon. Thirst was intense; appetite lost, and the tongue covered with white fur, yet about 8 o'clock in the evening, the fever commenced to abate together with headache. The case was diagnosed to be malarial, and 1.5 grammes of quinine was given in two doses. In the forenoon on the 7th, the temperature stood at 38° C. and, in the afternoon, at 39.° 4 C. The dull areæ of the liver and spleen being examined, they were found to have made no enlargement. From that time, the temperature remained somewhere about 39° rising and falling about 2 degrees. The prescribed quantity of quinine having proved inefficacious, it was on the 10th following, increased to 2 grammes which was given in one dose at 2 p.m. the same day. On the 12th, the temperature began to descend to 37.° 5 C. in the forenoon, and 38.° 7 in the afternoon. Headache also abated, but languor of the body ensued attended with loss of appetite, so a stomachic mixture was used in addition. On the 17th the respirations were 24, and an uneasiness was complained of in the chest. On examination, the heart sound was accentuated, but there existed no other abnormal physical signs. Urine passed 3 or 4 times a day, and on examination a weak acid in reaction, of brown color, and a specific gravity of 1018 containing slight albumen. On the 20th next day, the temperature returned to normal though only in the forenoon; in the afternoon it indicated 38.° 8 C. However, the temperature of the afternoon also began to descend day after day, so that it became normal on the 28th and remained so throughout the day. The languor of the body still lingered; the appetite returned to a certain degree, and the albumen in the urine was entirely gone on the 29th. A mixture of quinine and iron was now resorted to. After this, the strength of the body and appetite gradually returned to their normal state, and the patient was quite recovered on October 12th (Report of Chief Surgeon of the Maya.)

From what has been stated above, we may affirm that the malarial fever prevailing in Korean and Chinese territories is of various types, showing every parasite that exists. But every type is of a benign character, quinine proving efficacious in cutting them all short. During the war, the majority of the patient were attacked in the early days,—that is, in the months of July, August, and September 1894. The only patient who died of the disease was a barber belonging to the Chiyoda. He was attacked with quartan fever, and was at first treated on board the ship, but on account of increasing debility was removed to the Hospital ship Kobe-maru, where brain symptoms appeared which led on to unconsciousness, then the upper lobe of the left lung became inflamed, and at length the man succumbed after 5 weeks of suffering.

As regards the warships sent to the Formosa and the vicinity, the Yoshino had the largest number of malarial patients, that is 22 ; the Yayeyama and Akitsushima each 10 cases. That these localities are remarkable malarial districts is a fact already well known. We shall here quote some instructive points from a report furnished by Mr. Saito, Chief Surgeon of the Yoshino.

" The Yoshino arrived at Formosa on July 6th, 1895, and 2 cases of malaria appeared in August following. This event occurred while the ship was staying at Sō-ō-bay on the eastern-coast of the island. One of the patients was a carpenter who had landed and stayed on shore two days in order to repair a boat, and the other who was a cook who went ashore two or three times to make purchases of provisions. Thus they were infected with the fever. There was another patient in September, the cause however was not clearly known. Again, there suddenly appeared 19 patients from the end of October to the beginning of November. They were either men who had taken part in an attack made on the forts of Taihei-zan at Takau, or had waded across the muddy moats in front of the Anping forts which were also attacked and taken at that time. Taihei-zan is a mountain overhanging the Takau port on the north. There are forts on the mountain about eight-tenths of the way up from the base. The distance from the shore seems to be some 1400 or 1500 metres. On the way up the mountain, there is a spring of clear and refreshing water. Our landing party having been ordered to take possession of the forts, set out on their expedition. Before they reached their destination, the contents of their water-flasks had all gone, and they were obliged to drink from the spring. This unavoidable at the time, but was probably the main cause of the affection. Before starting, each man was given 0.3 of quinine, and was ordered to carry three days dose of the same. The cases were all favorable, for thanks to the quinine they were completely cured in a short time."

" Malarial fever in Formosa: The incubation period is from 6 days at the shortest to about a month at the longest. With those who landed at Anping, the disease appeared after 6 or 7 days, whilst those who went ashore at Takau, mostly showed it after an incubation of over 2 weeks. In both cases the types of the fever were indefinite, but they were all quotidian or tertian ; there was no quartan at all. Only one patient was affected with yawning during the preliminary stage. Chill existed in most cases, but there were a few cases which free from it. Rigors scarcely existed ; headache was constant, lumbago frequent, but pain in the nape and back very rare. In most cases, lassitude of the limbs was complained of though rarely attended with pain. The number of pulsations was in accordance with the temperature, and not slow as in enteric fever. Sweating occurred in most cases though totally absent in some. The enlargement of the spleen and liver was not remarkable. Nausea and vomiting were rarely present. The tongue was usually covered with white fur, but always moist, the papillæ not being prominent. In no case did abdominal pain and diarrhœa exist; on the contrary, the bowels were usually constipated. Albuminuria was not present. Complications such as bronchitis, pneumonia, pleurisy, and neuralgia never occurred. Thus the symptoms of malignant malarial fever being altogether absent, all the cases were completely cured after a favorable course."

Among the members of the Navy on home defence service during the war, there occurred only 22 cases of malaria, mostly very slight, and being of the tertian type, most of them were cut short by the use of quinine and completely cured within a week.

(5) INFLUENZA.

During the war, there occurred 37 cases of this epidemic, all at he front, and not a single case among the forces at home. To name the above cases in order of number, on the Yamashiro-maru, there were 9 cases, on the Banjō and Musashi respectively 8. The disease in each case originated at Port Arthur or Wei-hai-wei where the epidemic was prevailing. The Yamashiro-maru and the Musashi were at the former port during April and May, and the Banjō at the latter. The symptoms were generally slight, not attended with any complications such as pneumonia and the like. The cases on the Musashi and Banjō had short courses, completely recovering within a week or two. Those on the Yamashiro-maru ran longer taking 2 or 3 weeks before recovery.

(6) MEASLES.

As for measles, during May, 1895, there occurred 4 cases on board the Naniwa, and one in Sasebo Naval Barracks but they disappeared without making any further infection. This was probably because most of the ship's crew had already been affected with the disease.

(7) VACCINATION.

In China and Korea, owing to the backward state of their sanitation, no year passes without seeing more or less a prevalence of small-pox. Not a single case of this disease however occurred during the war among those of our men who had to go ashore on landing parties or other errands, nor among those who had frequently to mingle with the natives while staying in the harbours. This must be considered as a result of the strict enforcement of re-vaccination in our Navy; for there are regulations that every man newly enlisted shall be re-vaccinated no matter whether he has already been vaccinated or not, and that in December every year, re-vaccination should be performed on all who have passed five years since their last re-vaccination, the result of which is to be noted in the clinical record of each individual, and it has to be duly reported to the Medical Bureau in the form of lists.

Indeed, we may say that on account of such strict enforcement of re-vaccination, our Navy has been almost entirely a stranger to small-pox. The total number of cases of varioloid and variola that occurred in the Navy during five years 1891—1895, was no more than nine. Of these nine, two cases of varioloid occurred in February 1892, and one case of variola in December of the same year, all completely recovered without infecting others. In 1893 four cases occurred, that is, two of varioloid on the Katsuragi, and another on the Banjō, and one of small-pox in the Kure Naval Barracks. Investigation being made into the origin of these cases, they were all traceable to causes outside of the Navy. And these four cases all recovered. In March, 1894 (before the war) a man belonging to Torpedo-boat station at Tsushima was attacked with small-pox, and a stoker of the Kaimon with varioloid. After this, no case occurred during the war.

Of the aforesaid nine cases, those of genuine variola were three, the remaining 6 cases being varioloid. Of these three patients, one was probably infected at Kobe, where the disease was prevailing when he happened to pass through on his way to the Kure Naval Barracks from his home. The re-vaccination regulation had to be suspended in this case as the man was seized with the disease, soon after his entrance to the barracks. Anyhow, he had been vaccinated at his native place when young. The disease was of a rather severe nature, and the cornea of his left eye fell into ulceration ; he left hospital after more than ten weeks. The second patient was suffering from syphilis when he enlisted, so he was directly sent to hospital, which also prevented him from being re-vaccinated according to the regulation. With him, the disease was of a mild nature, and he was able to leave hospital four weeks after, completely recovered. The third patient was attacked by the disease, while on board a torpedo-boat staying in Kobe harbour, where the disease was then prevailing. He was said to have been vaccinated four years before with success, followed by two unsuccessful re-vaccinations. He recovered in three weeks. Of the six cases of varioloid, we can learn from records that two men had clear marks of vaccination, and that re-vaccination had no effect. The other four were re-vaccinated at the time of enlistment, but the existence of vaccination marks is not mentioned in their records.

The total number of small-pox cases that occurred in the whole country during the same five years was 92,990, of which 24,592 resulted in death,—that is, the rate of mortality being 26.44 to every 100 patients. During the two years 1892—3, the disease assumed an epidemic form producing the largest number of cases, and the said nine cases in our Navy all occurred during this period.

The following table shows the results of vaccination in our Navy during the five years from 1891 to 1895.

NUMBER OF MEN VACCINATED.

Result.	*For the first time.	For the second time.	For the third time.	For the fourth time.	For the fifth time.	For the sixth time or above.	Those either with distinct or indistinct marks of small-pox.	Total.
Successful ...	169	762	1,230	960	521	417	216	4,275
Unsuccessful ...	259	1,878	3,653	3,325	1,857	1,711	397	1,3080
Total	428	2,640	4,883	4,285	2,378	2,128	613	1,7355

* Those whose previous vaccination is uncertain are included in this class.

The following table shows the result per 100 cases of vaccination during the five years aforesaid.

Result.	For the first time.	For the second time.	For the third time.	For the fourth time.	For the fifth time.	For the sixth time or above.	Those either with distinct or indistinct marks of small-pox.	Average ratio.
Successful ...	39.49	28.86	25.19	22.40	21.91	19.60	35.24	24.63
Unsuccessful ...	60.51	71.14	74.81	77.60	78.09	80.40	64.76	75.37

The following table shows the results of vaccination in the whole country during five years from 1891 to 1895.

Year.	Total number of vaccinated.	Ratio of success of 100 cases of vaccination for respective ages.							
		For the first time.						For the second time or above.	Extraordinary Vaccination.
		Under one year.	Under two years.	Under five years.	Under ten years.	Under fifteen years.	Above fifteen years.		
1891	2,224,791	90.81	86.24	82.96	77.46	73.84	68.01	32.73	40.61
1892	6,086,472	88.99	81.55	77.13	74.98	70.83	1.15	33.54	31.77
1893	7,994,702	88.02	80.29	73.91	69.70	63.83	59.02	34.61	34.22
1894	4,225,724	86.12	79.31	68.14	63.19	59.40	55.98	31.23	37.48
1895	2,848,646	85.51	78.77	70.11	67.62	62.59	56.63	31.85	27.53

2.—CONSTITUTIONAL DISEASES.

(1) KAK'KE (Beri-beri).

Kak'ke is a disease that has existed in the countries of the East from very ancient times. In Chinese medical books, the first mention of it occurs some two hundred years before the Christian era, and in certain medical works of our country published a thousand years ago, the disease is mentioned. It seems that formerly kak'ke much prevailed in China, while it has greatly decreased there of late. The case is just the reverse in our country. Though in Japan the existence of the disease can be traced to a very remote period, it was almost confined up to a few decades ago, to such populous towns as Tokyo, Kyoto, and sea-ports as Nagasaki, etc., where travellers crowded from every part of the country, and had never prevailed over the whole land of the Empire as it is the case at present.

As for the cause of this disease, nothing certain is known as yet. Many hold a hypothetical opinion that it is an infectious disease caused by a specific virus (which may be a kind of bacillus not yet ascertained.) This is an opinion that might be expected from the general current of modern theory, and we are not disposed flatly to deny it. Nevertheless, it is our strong belief that the origin of kak'ke is intimately connected with a certain kind of food, and should not be regarded as one of the infectious diseases. In defence of this theory we mention the following circumstance which induced us to improve the scale of diet in our Navy for the special purpose of preventing kak'ke, which change has had remarkable results. Up to the year 1883, our Navy had been greatly harassed by the prevalence of the disease, a large number of the seamen at service both on land

and sea suffering from it every year. The numbers of cases of kak'ke that occurred during six years from 1878 to 1883, are as follows :—

Year.	Force.	Cases of kak'ke.	Ratio of kak'ke per 100 of force.
1878	4,528	1,485	32.80
1879	5,081	1,978	38.93
1880	4,956	1,725	34.81
1881	4,641	1,163	25.06
1882	4,769	1,929	40.45
1883	5,346	1,236	23.12
Average.	4,887	1,586	32.45

As will be seen from the above table, the average ratio of kak'ke per 100 of force in the six years was 32 ; and it frequently happened that during voyages to America, Australia and other regions so many of the crew were attacked by the disease that much difficulty was felt in the management of vessels. It now became an urgent need to take some proper measures for its prevention, and subsequently, Mr. Takaki, then Director of Medical department of the Navy instituted investigations as regards kak'ke, as the result of which he made a plan for improving the scale of diet. The allowance for a day's ration per man was 18 cents, which were paid in cash to ships or barracks, and the food was prepared as they respectively considered suitable, so the quality of food was not the same in all ships and barracks. But it was evident that the diet used in every ship and barrack fell in its nutritious value below the physiological standard. The daily programme of diet per man, then observed in ships and barracks was on an average as follows :—

Rice............	782 grammes.	Pickled vegetables...	145 grammes.
Fish...........	96 ,,	Vegetables...........	215 ,,
Beef...........	73 ,,	Sugar	18 ,,
Miso (a kind of bean stuff)			60 ,,

The nutritious value of the above amounts to 622.32 grammes of carbo-hydrates, 15.89 grammes of fat, and 109.29 grammes of albuminous substance. This falls far short of the minimum quantity of nutritious ingredients—that is, 500 grammes of carbo-hydrates 50 grammes of fat, and 118 grammes of albuminous substance, which according to the estimation of Dr. Voit is indispensable to a man of ordinary health and middle age, who takes adequate daily exercise. And if compared with the minimum quantity of nutritious ingredients of the food needed by a man who takes active exercise,—that is, 500 grammes of carbo-hydrates, 100 grammes of fat, and 145 grammes of albuminous substance, it shows a still greater deficit. Indeed, carbo-hydrates surpasses the quantity guaranteed by this physiological investigation, but fat and albumen are seen to be remarkably deficient. On the contrary, not a navy in the world has a diet of which nutritive value falls below the physiological standard. The diet of our Navy compared badly with that of European countries, but the sanitary conditions of our ships were not inferior to European, for most of them had been constructed in England, America, or other European countries, and were equally well equipped. The daily exercise and work of our seamen being organised after the pattern of the English Navy are identical. Our seamen are also provided with clothing and beds similar to those of the West. Despite these facts, we have never heard of the breaking out of *beri-beri* in any European warship sent to the East—to our waters. The crews of foreign ships floated on the same waters, exposed themselves to the same climate, with ours and they lived in similar ships, engaging in the same tasks, so that there was no other difference between our ships and the European but the diet. Consequently the other conditions of life being the same we naturally sought the cause of the disease first in the diet. Accordingly, in February 1884, a resolution for the improvement of the scale of diet was passed, and so the former method of paying in cash was now substituted by that of supply of substance, and at the same time the programme of daily ratios per man was fixed as follows:—

Rice	648 grammes (or 600 grammes of bread, or 490 grammes of sea biscuit)	Meat	300 gms.
		Miso	50 ,,
		Flour (wheat)	75 ,,
Fish	150 gms.	Beans	45 ,,
Vegetables	450 ,,	Pickled vegetables	75 ,,
Milk	45 ,,		
Sugar	75 ,,		

In addition to the above, 60 grammes of "Shoyu" (a kind of pea sauce), 15 grammes of fat, 8 grammes of salt, tea and vinegar and 90 grammes of "sake" (a Japanese liquor) were to be supplied.

The nutritious value of the above diet is equal to 775 grammes of carbo-hydrates, 43 grammes of fat, and 196 grammes of albuminous substance and was without doubt a remarkable improvement on the former one. In the first year of this innovation, that is, 1884, hindered by various circumstances, this change was not fully put in force, and yet its effect was plainly recognized by a remarkable decrease of the number of kak'ke patients during that year. Ever since concurrent with the enforcement of the improved plan, the disease, if not completely extirpated, has been brought under control, and the number of patients were so few that we were scarcely troubled with them.

The following table which shows the number of Kak'ke cases since the year 1878 is given for the sake of comparison.

Year	Force.	Case.	Ratio of cases per 1,000 of force.	Cases admitted to hospital.	Ratio of admitted per 1,000 cases.	Death.	Ratio of deaths per 1,000 cases.	Invalided.	Ratio of invalided per 1,000 cases.
1878	4,528	1,485	327.96	325	218.85	32	21.55	uncert.	uncert.
1879	5,081	1,978	389.29	485	245.20	57	28.82	8	4.04
1880	4,956	1,725	348.06	319	184.93	27	15.65	9	5.21
1881	4,641	1,163	350.59	300	257.95	30	25.80	16	13.76
1882	4,769	1,929	404.49	545	282.53	51	26.44	17	8.81
1883	5,346	1,236	231.20	378	305.83	49	39.64	4	3.24
1884*	5,638	718	127.35	209	291.09	8	11.14	1	1.39
1885	6,918	41	5.93	25	609.76	...	...	1	24.39
1886	8,475	3	0.35	...	...	...	...	...	...
1887	9,106	...	...	...	...	...	...	...	...
1888	9,184	...	...	...	...	...	...	...	...
1889	8,954	3	0.34	1	333.33	1	333.33	...	...
1890	9,112	4	0.44	2	500.00	...	...	...	...
1891	10,223	1	0.10	1	1,000.00	...	...	...	...
1892	9,747	3	0.31	...	...	...	...	...	...
1893	9,322	1	0.11	1	1,000.00	...	...	...	...
1894†	11,003	29	2.64	19	655.17	2	68.97	...	...
1895†	13,006	17	1.31	12	705.88	1	58.83	...	...
1896	13,035	11	0.84	10	909.09	...	...	...	...
1897	14,964	22	1.47	5	227.27	2	90.91	...	...
1898	18,426	16	0.87	4	250.00	1	62.50	...	...

* First year of the improvement in the scale of diet.
† War-time.

From this table, it will be seen that the improvement in the scale of diet has proved a great success, and the yearly ratio of kak'ke per 1,000 of force has never been larger than a mere fraction. We then made elaborate inquiries about the cause of these few cases, and it was ascertained that the sufferers were those who did not like meat and bread, and took rice to an excess. From this experience of our Navy, it is manifest that kak'ke has an intimate relation with diet. There may be persons who say that the almost total extirpation of the disease in the Navy is not to be attributed only to the improved diet, but to the amelioration of every other sanitary condition that was probably attained at the same time. But, in the year when the dietary change was introduced, no other sanitary change worthy of mention was made. It is certain that various sanitary measures such as the cleaning of ships, the reduction of time of work during the day in the hottest season, and the improvement of ventilation below the lower decks had been taken with the greatest care possible, but this was attended with no beneficial effect for preventing the disease, and it was not until after the introduction of the new dietary system that any sensible result was seen. Viewed from instances outside of the Navy, the same holds good. In prisons in the Empire, for many years, the daily allowance of food assigned to a prisoner was 750 grammes of rice, and some poor auxilliary food costing one or one and a half cents; and there were numerous cases of kak'ke. In the year 1875, the prisoners were allowed to have rice and barley, subsequently, in July 1881, it was enacted by law that at every prison barley and rice in the propotion of 6 to 4, should be supplied as the chief food. In prisons where barley was used from an earlier date, kak'ke had become much reduced, and since barley was made to form a part of the regulation food, it has become very rare in every prison. This change of diet in prisons was originally proposed with a view to economy and it was quite an unexpected result that the change turned out to be the cause of bringing the disease under control. Again, with soldiers of the Army the case was similar. Formerly in barracks of every district many cases of kak'ke invariably occurred every year; and the difference in numbers seemed to depend on the prices of commodities in respective districts. For, in the Army, the daily ration of a soldier was in former days 900 grammes of rice and auxilliary food costing 6 cents; accordingly in places where the price of daily necessities was cheap, a comparatively larger quantity or a better quality of food could be obtained, while the contrary was the case in such cities as Tokyo and Osaka, the prices being very high. The cases of kak'ke that occurred from 1882 to 1884 in the soldiers of different places are as follows :—

Year. / Place.	1882.			1883.			1884.		
	Cases.	Force.	Ratio.	Cases.	Force.	Ratio.	Cases.	Force.	Ratio.
Tokyo	3,775	10,240	36.86	3,887	10,822	35.91	5,553	10,910	50.89
Sakura	294	1,272	23.11	137	701	19.52	311	1,013	30.68
Utsunomiya	169	698	24.19	147	639	23.00	2	267	0.74
Takasaki	420	990	42.41	543	1,431	37.94	260	537	48.37
Shibata	45	798	5.63	43	716	6.00	250	757	33.00
Sendai	308	1,824	16.88	406	2,007	20.22	487	2,066	23.61
Aomori	102	1,508	6.76	21	1,458	1.44	29	1,105	2.62
Nagoya	190	2,287	8.30	452	2,301	19.64	390	2,839	13.73
Kanazawa	57	2,168	2.62	17	2,001	0.84	62	1,658	3.73
Osaka	1,087	3,801	28.59	1,475	3,725	39.59	1,275	3,588	35.53
Otsu	192	1,396	13.75	285	1,217	23.41	103	1,317	7.81
Fushimi	45	711	6.32	20	694	2.87	0	220	0
Himeji	307	1,323	23.19	214	1,286	16.62	188	1,325	14.17
Hiroshima	90	1,754	5.12	13	2,502	0.52	12	2,251	0.53
Marugame	4	1,401	0.28	0	1,457	0	0	1,336	0
Matsuyama	1	715	0.14	10	702	1.42	0	615	0
Kumamoto	412	3,892	10.58	264	3,068	8.60	558	2,740	20.36
Kokura	88	1,458	6.03	127	1,330	9.54	104	1,570	6.62
Fukuoka	119	572	20.78	52	492	10.56	0	213	0
Okinawa............	61	167	36.41	15	168	8.91	59	136	43.12

We see therefore that at that time kak'ke prevailed in the Army as much as in the Navy; this particularly being the case with the Osaka garrison, who were exceedingly harassed by it. The fact that the introduction of barley into the prison diet had almost extirpated kak'ke was suggested to the military authorities who accordingly tried the scheme with the result that the disease began in 1885 to decrease and at last the rates of cases per 1,000 of the force was reduced to less than 10. Subsequently barley was used in barracks at various places, and at the present day it is universally used in the Army, and kak'ke cases are becoming rare. As will be seen from the above table, there were many cases of the disease among the soldiers stationed in Okinawa, that is, the Loochoo islands. Kak'ke is not prevalent in these islands in fact we have never heard of a native having it. How can we account then for the fact that our soldiers are the only sufferers from kak'ke on the islands? They are stationed in the old castle which being located on a hill is the healthiest site in Shuri, the chief town of the islands. But we find that the natives, owing to a scanty production of rice and barley, live on peas, other grains and pork, and that our soldiers stationed there use rice mainly as food, we must attribute the cause of kak'ke to the diet. At the ordinary school of the same island where young natives are educated, the students are made to lodge in the dormitory, and were formerly given rice for their daily food, and a severe outbreak of kak'ke was the result. This must be attributed to the change of diet for these students were natives who up to that time in common with their families had never suffered from the disease. A rumour was afloat that virus of the disease was propagated by visitors as the teachers of the school and others, but it was quite groundless, for none of them happened at that time to have had kak'ke. Besides these, there are many analogous instances, for example the defence force of Tsushima island is composed of men enlisted in the island, and there, as in the Loochoo islands, owing to a scanty production of rice, it is very rarely eaten and consequently, the natives had never had an outbreak of kak'ke. However, when they enlisted as soldiers, they were often attacked by the disease. Again in January 1899 kak'ke suddenly broke out and raged at the prison of Niigata, and from the 15th of the same month to the end of March about 400 persons out of some 1,000 prisoners, were so seriously affected with the disease that they had to be admitted to hospital. This was apparently a very strange phenomenon, now that kak'ke had become a rare disease in prisons since the introduction of the barley rice diet and accordingly an investigation was made by despatching a committee from the Navy medical department to the said prison. As a result of the investigation, it was found that on account of dearth in that region and consequent rise in the price of barley and rice, cheap rice imported from China etc. had been bought since December of the previous year and used in place of the native barley and rice. As no other reason could be found for the sudden outbreak we must attribute it to the change in diet. At the same time it was found that the disease attacked the prisoners in a larger number, who were supplied with "white Chinese rice," while it affected in a smaller number those with "red Chinese rice." This goes in some degree to prove the experiments made by Dr. Forderman at Madura, and by Dr. Eikmann at Batavia. The red and white rice differ in their respective ingredients as their appearances do; the red compared with the white has a larger quantity of fat and albumen. At the said Niigata prison, from the March 1899, barley and rice were used again, which resulted in the gradual disappearance of kak'ke in the prison.

The apparent frequency of kak'ke in places which were hot, damp, and crowded and where it affected a large number of persons at a time, led many to infer that the disease is caused by the contagion of some virus or micro-organism. But we think otherwise. It is true that kak'ke is very scarce in winter, and very abundant in summer, and also that it occurs far more frequently in crowded places. Our explanations of these facts are as follow: in the hot season every body is relaxed and consequently disinclined to take exercise; hence the appetite diminishes. It is a well known fact among ourselves that in such a season we Japanese are apt to prefer plain diet to meat and other fatty things. Besides, in summer, fish are much used among us, and as they are liable to putrefaction if not eaten at once they become so dear that ordinary people can not afford to obtain fresh fish. The Japanese therefore often satisfy themselves with so-called "chazuke-meshi" (a plain boiled rice mixed with tea), and thus owing to the comparative insufficiency of other nutritious food, they become more liable to the attacks of kak'ke. No matter how cold the temperature may be, severe kak'ke will constantly make its appearance, whenever a large quantity of rice is taken in the absence of other diet rich in nitrogenous and fatty ingredients. The aforementioned prevalence of kak'ke in Niigata prison is an example of this. Niigata being situated in the north of our country is a very cold region, the epidemic broke out in the month of January, when the temperature is at its lowest and just at that time the ground was covered with snow several feet deep. The island of Shimushu at the northern extremity of the Kuriles faces Kamtchatka and washed as it is by the cold current of the Behring Strait, is the coldest region in our Empire. Up to the year 1884, some 100 aborigines lived on the island, but in that year they were all removed by the order of the government to the island of Shikotan and for several years, Shimushu remained in a deserted state. However, many years ago, certain adventurous persons proposed to undertake the colonisation of the island, and in 1895, 6 persons passed the winter there as an experiment. In the coldest month, i.e. in January, kak'ke made its appearance and affected 4 persons, 3 of whom fell victims to the disease. According to the information furnished by the survivors, the only food they had left was rice, "*miso*," and salt; and being prevented by heavy snows, from going out either for hunting or fishing, they were obliged to kill their pet dogs for food for their sick men. It is not difficult to imagine the quality of their diet. Again in the summer of 1896 a number of men and women emigrated to the island. They fared well till November, but at the end of that month, 2 persons were seized with kak'ke; in December 3 more, and from January numerous cases appeared in consequent succession. Out of 37 men above 15 years of age, 26 were affected of whom six died; and out of 11 women above 15 years of age, 9 were affected and one died. Here, the cause can again be traced to what they ate. Dr. Ito, who joined the emigration party, reports that as the cold increased, both fishing and hunting were interfered with, and thus, totally deprived of fresh meat —for even the cattle they had brought with them mostly succumbed to the cold, they had to live on a very scanty supply of nitrogenous food. We think that as long as they were engaged in fishing and hunting, they had suitable outdoor exercise, their appetites were healthy, and they took sufficient quantities of meat, of which there was still an abundant store. In the winter, however, they were confined to their huts, and took insufficient exercise ; their appetites declined in consequence, and they probably soon grew tired of such fatty diet as canned meat, we Japanese are not much accustomed to a diet of this sort and the persons in question were probably only too glad to take to the boiled rice and pickled vegetables with which they were so familiar. Similar cases have not unfrequently been observed in other quarters. During the voyages of our training ships in the hottest climates, the crews have often lost their appetite, and cases of kak'ke have been frequent, a fact that must be accounted for on the same grounds as those we have just stated. It is not difficult we think, to draw an inference as to the origin of the outbreak on Shimushu island. And now we do not hesitate to conclude that whenever rice is used as the principle article of food in the absence of other nitrogenous diet such as meat, kak'ke may prevail as well in the coldest as in the hottest regions. Besides the above examples, there have occurred many fatal cases of kak'ke among the persons who have passed their winters as an experiment on the islands of Shashikotan, Tokumu, and Horo-mushiro in the Kurile group. When a large number of emigrants made a second trial to pass the winter there in 1897, their former experience suggested to them to provide themselves with ample store of food, and they also took much care that indoor exercises should not be neglected. Not a single case of kak'ke occurred this time, and the island is now receiving fresh immigrants every year. To mention another example; in the year 1895, a man and his wife attempted to make meteorological observations on the summit of the famous Mt. Fuji, which has a height of 3,800 meters above the sea-level. They commenced their stay on the peak in September of that year. About Novomber both of them were affected with kak'ke which gradually became so serious that at last they were obliged to come down at the end of December. Fuji is a peak of almost everlasting snow which covers it all the year, except for a few days during the hottest time of summer, and of course the cold in winter is extreme. No explanation of this case of kak'ke can be given except that the conditions were generally the same as on Shimushu island.

In both cases it is urged by some, the parties concerned were compelled during winter to confine themselves to a room or rooms with all windows and doors shut and a stove constantly burning within ; and this made the air so foul as to cause kak'ke virus to develop. This argument seems to have some semblance of truth, but we think it is wrong. Shimushu island had for years been inhabited by the aborigines whose habitations were all in caves damp and dark; and therefore the quality of air was not to be compared with that of the huts our emigrants lived in. Yet as far as we have been able to learn of the original inhabitants of Shimushu now living in Shikotan, they were never affected with the disease in their former home. We believe therefore that all the influence that foul air can have on kak'ke is indirect and nothing more; impairing the general health and digestive functions. At Seoul, Fusan, Chemulpo, and other places in Korea, numerous Japanese live side by side with the natives, yet every year the disease attacks Japanese only while the Koreans are almost free from it. As regards dwelling, the Korean houses are small, dark and unclean, and many Koreans lead a very miserable life several grades below that of our people. Yet, kak'ke occurs among these two classes of people in a reverse proportion. In our opinion, this must be attributed to the fact that the Koreans chiefly live on peas and do not eat so much rice as the Japanese do. If kak'ke is of an infectious character as some believe, it is quite unaccountable that it should not spread among the natives in such a case. Then again, observe the condition of a Chinese town : the uncleanness of the streets by far surpasses that of our towns as a rule. Nevertheless, Chinese suffer from the disease far less frequently than the Japanese. The fact that in our country it once prevailed in crowded places as barracks and prisons, etc., and that even at the present day the persons most frequently attacked are boarders in schools, inmates of factories and boarding-houses, apprentices of various kinds, all points us in the same direction. These persons unlike those who live at home, are served with an almost uniform diet from day to day, and are unable to make their choice according to their liking. Indeed, boiled rice is what every Japanese eats with fondness, but as regards auxiliary food, each man's taste differs as his face does—so also with modes of cooking. Despite this, the auxiliary food served to the people above mentioned is as a rule very poor. For instance, the beef or pork is so tough and inferior in quality that even those who have exceedingly good teeth can scarcely masticate it. Consequently, the quantity of rice taken by these people is apt to increase owing to the unavoidable insufficiency of auxiliary dishes ; and especially so in summer when the appetite declines, and has to be stimulated by " chazuke-meshi " as already mentioned. No wonder then that these persons are favored subjects of kak'ke ; mere crowding can not be counted as in itself a sufficient cause of kak'ke.

Then observe the prisons throughout the Empire, and the naval station at Yokosuka. The present buildings are identically the same with those of the former days, and have quite as many inmates as in the days of the kak'ke prevalence, yet the disease has almost been extirpated since the advent of the new dietary system. The re-appearance of the disease consequent on the revival of rice-diet in the Niigata prison will confirm our opinion. Again, in some factories, a part of the laborers are boarded in the premises while the rest are day-laborers living in their own houses. There have been many instances where kak'ke prevailed among the boarders only, while the day-laborers have been quite free from the affection ; and this occurred in spite of the fact that these two classes had to work together in the same place for the same length of time. This can only be accounted for by the difference of food they used, and clearly shows that kak'ke has no infectious character. Next, it is a well recognised fact that men are far more liable to kak'ke than women, as can be proved by comparing the numbers of cases occurring every year among both sexes. This we believe is because there are comparatively few women living under such unfavorable conditions. If more women were placed in similar circumstances with men, they would suffer quite as frequently ; of late years, in consequence of the development of our industry, factories have been springing up in which women are chiefly employed, where the women are lodged and boarded in the premises. In such places, kak'ke makes frequent inroads. This has also been the case with girls in boarding schools and similar institutions. All of these instances go to justify our opinion.

Now let us turn our observations to instances of kak'ke prevalence in foreign countries : these will strongly support our argument that kak'ke owes its origin to rice. The outbreak of the disease among the settlers in New Caledonia is believed by some to have been caused by the introduction of the specific virus, and they quote this as evidence for its infectious character. But, if we examine the interesting reports furnished by M. M. Grall, Parée, and Vincent, it will seem proper to attribute the origin of the kak'ke prevalence among the Annamese settlers of 1891, and the Japanese of 1892, alike to the quality of food, and not to infectious virus or miasmatic poison. (See Nos. 2, 3, and 4 of the 3rd volume of Archives de Médecine Navale et Coloniale). When the Annamese settlers, 758 in all, started from their home in February, they were all very healthy. After a voyage of about a month, they arrived in Orphelinat island, when it was found that kak'ke made its appearance. After landing, the number of patients began to increase. Thereupon, they judged the island to be unhealthy and removed part of the settlers to Freycinet island. On the latter island, the disease raged with still greater force, so much so that the settlers had again to be removed to Kautio, where it continued to rage as ever ; the total number of the patients from the first outbreak to that time reaching to several hundreds, of whom 70 succumbed to the disease. As for their food, it was at first one kilogramme of rice and 200 grammes of salt fish ; the fish was putrescent and almost unfit for use ; but, owing to the lack of other food was used until the 25th of April when in compliance with the advice of the doctors, all that remained was thrown into the sea. The new rations appointed from that time were one kilogramme of rice, 200 grammes of meat, 100 grammes of vegetables ; but of the meat and vegetables, they could not obtain a proper supply. At the end of July, work-houses for the emigrants were completed, and for the first time, the immigrants were able to buy their own food with wages they had earned. By the month of August, kak'ke is said to have entirely disappeared. Next, the settlers from Japan numbering 600, started in January, and arrived in New Caledonia after a voyage of 18 days, taking up their abode at two places, Méli and Toumourou. About the middle of March, several cases of kak'ke occurred, and by the 28th of May, no fewer than 438 persons had been attacked by the disease. At first, we are informed, their diet consisted of 900 grammes of rice 50 grammes of fish, but as the fish was very dear, it was replaced by 110 grammes of dried shrimps, for which the same quantity of sea-weeds, cabbage, or sometimes pickled-plums was often substituted. The prevalence of kak'ke gave the authorities the hint to improve the food, which they did, allotting 225 grammes of fresh meat and 1,500 grammes of bread. After this change of food was introduced, the disease, as we understand, disappeared. The reporters of this event seem to lay more stress on fish-poisoning as having been the cause, and it is true that the fish was actually too bad for use.

In our country, there have been and are not a few who would attribute kak'ke to fish-poison; for example Professor M. Miura instituted elaborate investigation to prove this theory of fish-poison, though without success. Poisoning by decayed fish is of frequent occurrence here, but it can not be shown to be the cause of kak'ke. Others think that a certain kind of rice may be the cause, and Dr. Sakaki and others set on foot investigations to prove this supposition but again without satisfactory results. We do not therefore hesitate to account for these outbreaks by the hypothesis that they were, (as is always the case) produced by the use of rice in comparatively large quantities along with a deficiency of other nutritious substances. To mention other similar instances: the Cossacks belonging to a pearl fishing expedition, in Torres Strait were once owing to the lack of suitable food compelled to live only on rice, with the result that kak'ke suddenly broke out among them, and were only saved by getting a supply of wheat flour from an American ship, that happened to pass by. Again, in 1882, a terrible cyclone occurred in Manila destroying very many native houses and there followed a prevalence of cholera. All this while, the people had to live only on rice, and kak'ke raged with terrible force, no fewer than 20,000 people falling victims to it. Nothing can better justify the correctness of our theory that kak'ke is caused by excessive use of rice with a deficiency of other nutritious food. In the instances of kak'ke prevalence in Australia, Peru, Fiji, and Hawaiian islands and many other countries, which have newly been visited by kak'ke, the circle of prevalence never extended beyond the Japanese or Chinese whose chief diet consists of rice. Settlements of Japanese in foreign countries have met with a similar fate, whenever they have lived on a diet similar to that used in New Caledonia. Yet we have never heard of a single instance in which the disease has spread among foreigners who lived on a different food. Again there are many Japanese living in European countries on official business, or for trade or study, but as they have the same diet as Europeans, none of them have ever suffered from the disease. On the other hand the seamen belonging to the N. Y. K's ships on service on the European routes, were not unfrequently attacked with kak'ke ; no matter whether they were in Marseilles, London or Antwerp ; and this was plainly because they took the same diet as at home ; for as soon as the company turned its attention to the food of its seamen kak'ke cases diminished. Some may suspect that there was a kak'ke virus lying concealed in the ships; but there are many instances to the contrary. Thus, during the Japan-China war, ships belonging to various steamship companies were chartered by the government for purposes of transportation and communication, and a certain number of seamen from the Navy were distributed to each ship. The seamen from the Navy were employed on the same duties as the other, but the former were served with the regulation diet fixed by the Navy, whilst the original crew of the ship had their own food. The seamen of the Navy were entirely free from the disease, while many of the sailors belonging to the ships were attacked by the disease. The companies then introduced changes of diet and all the sailors on board those ships were made to receive the same kind of rations as the seamen of the Navy. Again, in Brazil, beri-beri has existed from ancient times, but so sporadically that it attracted little attention ; during the last thirty or forty years, cases seem to have been increasing in frequency this is construed by many as showing its origin is attributable to the propagation of the kak'ke virus owing to the developments of communication ; and such persons conclude that it is an infectious disease. Having had no opportunities of investigating the disease in that country we are unable to offer any definite opinion ; but we think that we may reasonably seek a cause in the conditions which in our own country have so abruptly increased the number of kak'ke cases during the last 20 or 30 years. As we have already stated, in former days kak'ke in our country was confined to such cities as Osaka and Tokyo, where people crowded in from other districts but *pari passu* with the increase of intercourse and commerce, the disease spread all over the land. Our explanation of this phenomenon is as follows: as means of communication increase, trade and intercourse become more frequent; schools and factories spring up here and there, attracting people to themselves ; and as a consequence the number of persons boarding in other houses greatly increases (the reader will remember that boarding houses never use barley and rice but rice only for their boarders). Besides, with the development of communication with foreign countries, the import of foreign rice (which is very inferior in quality) has given a plentiful supply to districts which hitherto were short of rice. And what is more, barley fields have lately been turned into mulberry plantations, owing to the development of sericulture. Hence the use of rice and especially inferior rice has greatly increased, while that of barley has decreased. The fact that kak'ke prevails in newly erected barracks and prisons also goes to prove the correctness of our opinion. From these facts, we infer that the prevalence of kak'ke in Brazil was attributable to an over abundant supply of rice from other countries, as has been the case here. We are informed that though the inhabitants of Brazil all live on rice, yet owing to its scanty production in their own country, the greater part of their stock comes from abroad ; and that kak'ke taking Bahia as its centre, has spread into Rio de Janeiro, Santa Catharina, Pernambuco, Maranhâo, Ceará, and other sea coast districts, and so gradually into the interior. We may reasonably think that with the progress of means of communication, there comes an increased supply of rice which is in its turn followed by a visitation of kak'ke, and we do not know whereelse to look for an explanation of the fact that in spite of its prevalence throughout Brazil, the neighbouring Uruguay is free from kak'ke. It it true that in Uruguay since 1891, kak'ke has been regarded as an infectious disease and placed under the same regulations as regard to preventive measures as cholera or yellow fever, but for many years previous to that date, kak'ke patients belonging to Brazilian ships had constantly been admitted to the hospital at Mont-video. Yet no case of kak'ke which could be regarded as infectious has occurred in the country itself. We venture therefore to affirm that kak'ke has an intimate connection with inadequate combinations of food and especially with an absolutely or comparatively large consumption of rice—: and that the only sure and effective measure for its prevention is the keeping of various nutritious articles of food at the physiological standard. Kak'ke always prevails where the rice is the principal food of the nation. We have not yet been able however to find out the reason why rice should be the cause of kak'ke. It may be, as some think, a kind of dyscrasia caused by want of albuminous substance in excess of carbo-hydrates, just as alcoholic neuritis is caused by prolonged excess of alcohol and consequent diminution of comsumption of meat &c. The question requires further investigation ; yet it is beyond doubt that this disease has an inseparable relation with the quantity of nutritious elements in the food. Or, it may be caused by some particular poisonous substance existing in rice though not yet discovered. If the outbreak at Richmond Asylum, in Ireland, was truly kak'ke we must say that the disease has no connection with rice, but depends only in combination of various nutritious ingredients of food. Lastly, it is a well known fact that when a patient affected with kak'ke in one district is removed to some other district, it has a favorable effect on the cure. Some think this is because the patient is away from the poisonous district, and that the disease is endemic or infectious. But in our opinion, what is good for a disease and what is the cause of the disease are quite different questions. For instance, it is true that patients affected with kak'ke in Tokyo often recover speedily when removed to such mountainous district as Hakone, but if persons who are healthy in Tokyo be sent to Hakone and there be made to live on the same diet as those who were affected with the disease in Tokyo, the pure air of Hakone will not save them from the disease.

We therefore come to the following conclusions :—

(1) The only persons who are attacked by kak'ke in Eastern countries are those who use rice for their daily food, and on examination, it has been ascertained that the nutritious substance of their diet is generally below the physiological standard and that if the diet be improved so that the various nutritious ingredients do not fall below that standard, kak'ke will certainly be prevented before it comes to light.

(2) The extirpation of kak'ke in the Japanese Navy since the year 1884, is entirely to be attributed to the improvement in the scale

of diet, and no other hygienic improvement has been recognised as having had anything to do with this result.

(3) Instances of kak'ke prevalence in our country that have been greatly reduced or totally extirpated by the improvement of diet are to be found not only in our Navy, but in Army barracks and prisons all over the Empire.

(4) It is an indisputable fact that kak'ke is most frequent in warm or hot seasons. This we believe is because, owing to the inertness of the appetite in those seasons, the Japanese are very apt to take nothing but plain meals as " chazuke-meshi." If such food be used too often or exclusively, the disease will break out in the coldest season just as much as in the hottest.

(5) It is evident that kak'ke is liable to prevail in crowded places such as barracks, factories, and prisons. Persons in these places get their food served to them regardless of their own choice of dishes, with a consequent increase in the quantity of rice. They are thus very liable to the disease. Such persons will enjoy immunity from kak'ke, no matter how low and damp their places of abode may be, if only they are able to make free choice of food.

(6) If we make investigations about instances of kak'ke prevalence in districts that have not hitherto been visited by it, it will surely be found that the disease has been taken abroad by people who take rice in large quantities.

(7) The increased prevalence of kak'ke in Japan within the last 20 or 30 years, is to be attributed to an increased supply of rice in all districts, and also the increase of persons boarding in other people's houses. The prevalence of the same disease in Brazil, is, we believe, to be accounted for on the same grounds.

(8) The circumstances attending all the prevalences that have come underour knowledge, show that kak'ke can not regarded as an infectious disease.

(9) Our observations about kak'ke in Japan and the East, show that it has always an inseparable connection with the use of rice in comparatively larger quantities together with a lack of other nutritious substances, i. e. albuminous and fatty substances. On the other hand, its prevalence in a lunatic asylum in Ireland, constrains us to think that the disease may occur without the use of rice.

(10) If we use proper diet, kak'ke will certainly be prevented at any season in any place ; neglect of dietary precautions will always be followed by an outbreak of this disease.

(11) We can enumerate several examples of toxic form of multiple neuritis due either to inorganic or vegetable substances exclusive of micro-organisms, such as arsenical neuritis lately occurred in Manchester and several other places in the north of England, or neuritis caused by lead, alcohol, ergot, morphine &c.

Forty cases of Kak'ke occurred during the war, and three men died, the ratio of cases per 100 of force being 0.27. The thirty two cases of Kak'ke occurred on board the following vessels, viz : The Takachiho (12), Matsushima (3), Atago (3), Ōmi-maru (2), Akashi-maru (2), Akitsushima (1), Katsuragi (1), Yamato (1), Tenryu (1), Kaimon (1), Maya (1), Shinagawa-maru (1), Genkai-maru (1), Yedo-maru (1), and Genzan-maru (1). The eight others occurred at the following shore stations, viz : the Naval Barracks of Kure (3), of Sasebo (2), of Yokosuka (1), of Port Arthur (1), and the Base station of Longreach in Korea (1).

As already mentioned, an improvement in the scale of diet was effected after 1884 and this disease diminished consequently year after year, until it was nearly extirpated in Navy. The disease, however broke out afresh ; the following will account for it. In April 1894, the Takachiho was despatched to Hawaii and as soon as she returned, she was repaired with extraordinary speed, and sailed immediately for the expedition. As there was a comparatively poor supply of fresh food, the seamen ate too large a quantity of rice.

Out of the twelve patients on the Takachiho, ten were stokers, whose hard work in the boiler room at a high temperature in a hot climate, caused them to drink water to excess, in consequence of which they disturbed their digestive organs. It was these circumstances that caused so many cases of the disease to occur on this ship.

The three patients on the Matsushima suffered from a poor supply of fresh food ate, too large a quantity of rice and overworked themselves in the hot climate of Formosa. The two patients on the Ōmi-maru and the one on the Akitsushima did not eat too much rice but both suffered from a poor supply of fresh food and overwork in the hot climate of Formosa.

The one patient on the Maya always disliked meat and was fond of liquors ; and, as the one patient on the Kaimon had a great liking for sweets he celebrated his return home by eating sweets to excess thus disturbing his digestive organs. The three patients on the Atago, and the one on the Katsuragi were obliged to take preserved food for a long time during the expedition ; so that they took a dislike to preserved meat and hard biscuits towards the end of the expedition. The one patient at the Base station was a seaman on board the ship Chikugogawa-maru belonging to the station and took rice to excess.

The two patients on the Akashi-maru, and the single cases on the Shinagawa-maru, Genzan-maru, Yedo-maru, and Genkai-maru with the two at Sasebo and one at Kure Barracks (the last three men were from the crews of transports who came in after the occurrence of the disease) did not take regular food whilst on board the transports because these vessels were not war-ships and not under Navy regulations. The other case at the Kure Barracks was a second reserve man who had already suffered from the disease before the call.

The one patient at the Naval Barracks of Port Arthur was attacked by Kak'ke after the occurrence of rheumatism.

The single cases on the Tenryū, and Yamato, and at the Yokosuka Barracks, disturbed their digestive organs by over-eating and over-drinking after a returning home after long stay in camp.

The cause of one case of Kak'ke at the Kure Barracks is not certain.

Summing up the above mentioned, we conclude that each case of kak'ke originated directly from want of proper food and indirectly from the impossibility of taking proper food which resulted from injury of the digestive organs from ascertained causes. Hence the principal cause of the disease was undoubtedly improper and bad food.

Kak'ke which prevails in Japan is the same disease as that known in other Asiatic countries under the name of beri-beri, and it is commonly divided into three forms,—the acute or that form affecting the heart, subacute, and chronic.

Let us now mention two cases of the **acute kak'ke** which affecting the heart proved fatal.

J. Yamada aged 28 years 6 months, signal-man of the Takachiho, since August 15th 1894 complained of œdema and numbness of the lower extremities, with weakness below the knee-joints; loss of appetite, fullness and tenderness over the epigastrium, and constipation. These symptoms aggravated by degrees, and at last distress in the chest and palpitation were complained of, so that the patient was, on September 10th, removed to the hospital-ship. On examination, the patient was found emaciated and anæmic; the tongue was furred, appetite lost, and a sense of distress in the pit of the stomach with tenderness. The abdomen was generally distended, there was numbness of the lower extremities. The patellar reflex was absent. Palpitation was severe, pulse weak, temperature normal. A dose of sulphate of magnesia was given followed by stomachic mixture, and absolute rest was ordered. The patient constantly complained of distress in the chest; palpitation increased more and more, and a soft murmur was audible at the base of the heart. Dry cough existed, but no abnormal physical signs in the lungs, nor any alteration in the mind. Now it was manifest that it was a case of kak'ke affecting the heart, and in spite of every possible remedy, the symptoms became worse and worse. About 1 p.m. September 12th, palpitation grew intense, and the patient was struggling with the agony of death. The pulse was 108 in the minute, respirations 52; the limbs became cold and sufferer at last succumbed.

G. Satō aged 36 years 6 months, smith belonging to the Takachiho, since about September 5th, 1894, began to feel weakness in the lower limbs. This was soon followed by numbness of the limbs, to which however the patient at first did not pay much heed. But after a time, the knee-joints became relaxed making it difficult to walk, and consequently he applied, on September 20th, for medical help. On examination, he was rather emaciated; the lower limbs were swollen and numbed, the patellar reflex was lost. Palpitation with sense of oppression in the chest was complained of. The case was diagnosed as kak'ke, accordingly a saline purgative was administered, followed by a mixture of digitalis and nitrate of potash, and the patient was ordered absolute rest. On September 24th, the epigastric region became distended with frequent nausea. Palpitation sowewhat increased, and there was fear of the heart being affected. Therefore calomel and jalap were given as a purgative, with sinapisms on the chest. Also cocain was used as an antemetic. By the 27th following, nausea and vomiting had ceased and the other symptoms appeared favorable. However, on the 29th, all the previous symptoms returned; the patient complained of great distress in the chest, and the heart action became quick. Cold and sinapisms were applied to the chest and a purgative enema was used but these measures proved ineffectual, and his strength was gradually waning. Hereupon, subcutaneous injection of camphor and ether was resorted to by which the heart action was indeed restored for a while, but its activity again collapsed, and the patient at last expired at 5.35 on the 30th following.

Two cases of the **subacute kak'ke** are givenbelow as typical examples:

K. Deguchi aged 29 years 9 months, seaman of the despatch-boat Akashi-maru, about September 22nd 1894 noticed a swelling in the lower limbs but not so much as to trouble him greatly, but on the 25th following, the swelling greatly increased attended by numbness which caused difficulty of walking, when he applied for medical help, he had tolerably good nutrition of the body, the tongue was covered with yellowish-white fur, appetite lacking, the bowels costive, the pulse full and strong 84 in the minute ; the temperature was normal, the spirit was somewhat depressed, and a slight headache. The legs were swollen, so that marks were left on pressure. Besides, the calves of the leg were remarkably tense, with frequent spasm, and the numbness existed along the inner side of each leg, extending down to the dorsum of feet. The patellar reflex was lost. The urine was of amber colour presenting acid reaction, but without any abnormal ingredients. Palpitation was complained of, though physical examination detected no change in the position of the heart, nor in its sounds. The case was diagnosed as subacute kak'ke, and a mixture of tincture of rhubarb, and cream of tartar was given accompanied by a dose of sulphate of magnesia as a purgative. This afforded a free motion, consequently appetite returned. By October 9th, the spasm of the calves was relieved, and the swelling and numbness of both legs abated. The patient completely recovered on the 22nd of October the same year.

K. Asō aged 33 years 11 months, carpenter of the Sasebo Naval Barracks about August 24th, 1894 felt pain in the loins on bending. After a time, the pain extended to both thighs, when he was medically examined on board the Hashidate, and on September 7th, he was removed to the hospital ship Kobe-maru. He left the hospital-ship greatly relieved, but the numbness of the fingers and legs which had come on while on the hospital-ship was still lingering. On October 9th, he returned to the Barracks, where the lower limbs again commenced to swell, and the knee-joints lost power and walking became difficult. The patient again applied for medical help. On examination, he was found to possess a very good constitution, nutrition normal, without any sign of anæmia; numbness existed in the tips of the fingers and legs, the latter of which were so swollen that when pressed deep marks were left. The knee-joint was loose and walking proved difficult. The patellar reflex was lost. Palpitation was marked, the pulse full and counted 102, heart sounds normal, appetite and bowels not affected. According to the patient, the food he was given while he was on board the hospital-ship Kobe-maru was very poor; that is, it consisted of rice chiefly with dishes such as pumpkin, winter-melon and some dried vegetables, and with quite a small ration of meat. The case was diagnosed as kak'ke, and a mixture of bicarbonate of soda, sulphate of magnesia and tincture of nux vomica was administered. However, seeing that it would run a long course, the patient was sent to the Sasebo Naval Hospital on October 14th. At the time of admission, the patient had numbness in the legs, and tips of the toes; the patellar reflex was lessened, palpitation apt to come on by any slight exertion such as walking. The former prescription was continued, with nutritious diet. Thus the patient was fast convalescing with the restoration of the patellar reflex and walking power returned to normal state. He left hospital on November 7th completely recovered.

A case of **chronic kak'ke** is as follows:

K. Okamura aged 33 years 10 months, petty officer belonging to the Atago applied for medical help with the symptoms of numbness in the hypogastric region, and impairment of appetite. On examination, the tongue was covered with white fur, the temperature normal, the pulse 80. Numbness was present in the hypogastic region, but the lower limbs and other parts were normal. The case was diagnosed as kak'ke. A dose of sulphate of magnesia was given followed by stomachic mixture. After a time, the numbness extended down to the lower limbs, and walking became almost impossible. The patellar reflex was reduced greatly. Judging that it would take a long time for recovery, the patient was sent to the Sasebo Naval Hospital. At this time, he was found much emaciated and anæmic. Appetite normal, no fur on the tongue; the bowels open once every four or five days. Numbness was present in the lips, the tips of the fingers, and all over the lower half of the body from the hypogastric region to the toes. Consequently, the grasping power was greatly reduced, and the muscles of the lower limbs were exceedingly weakened, so that the patient was unable to stand or walk. The calf of each leg, when grasped, proved to be hard and painful. The patellar reflex was totally lost, urine normal; palpitation existed though not accompanied by any change in the sounds and position of the heart. Various treatments were tried but recovery has proved vain, the patient was removed to the Kure Naval Hospital on October 28th. When examined there, the patient was found greatly impaired in nutrition, and anæmic; all the muscles of the trunk as well as of the limbs were quite emaciated, and especially the case with the gastrocnemius. He could not walk owing to the loss of power in the lower limbs, the patellar reflex entirely lost. The lower limbs were benumbed, which was specially marked along the inner side of the legs, and feet, and there was tenderness in the calves. It was diagnosed as a case of chronic kak'ke. Accordingly, stomachic mixture combined with sulphate of magnesia was given, and a mustard hip bath was tried once a day. By this treatment, the numbness of the lower limbs gradually abated in common with other symptoms. On November 21st, he was removed to the Naval Hospital at Yokosuka. At that time, his condition was just as above stated. Internally a mixture of the tincture of nuxvomica, tincture of belladonna, and dicoction of cinchona bark was given, and the electric current was applied to the lower limbs every day. At the same time, great care was taken about his diet, nutritious and digestible food being selected. By the 10th of January, 1895, all the symptoms had improved, and the patient was able to walk with ease. The former prescription was now substituted by pills of quinine and iron. Ever since this time, he was convalescing, so that he left hospital on the 11th of April. This case ran a course of 210 days from the commencement to its total subjugation, of which he was under treatment for 187 days.

(2) ACUTE ARTICULAR RHEUMATISM.

The total number of cases of the acute articular rheumatism was 57. To give the details, 29 men in ten warships sent out on the expedition, 9 men ashore in the occupied territories of Port Arthur, Tahlien bay, and 19 men among the force staying at home. The number of cases of this disease during the war exhibited no special increase if it is compared with those of preceding years, we find that it presents but an insignificant difference. The 37 cases which occurred during the three months of April, May, and June, 1895, had their cause in the sudden change of weather and temperature, as it happened just to be the rainy season. However, there was not a case among them with affection of the cardiac valves.

(3) SUN-STROKE.

At the Kure Naval Barracks, 2 cases of sun-stroke occurred on August 12th, 1895. At that time, the temperature of the atmosphere was 86° F. at 10 a.m., 91° F. at 4 p.m., and 88° F. at 10 p.m.

W. Kurokawa, aged 22 years, seaman belonging to the Kure Naval Barracks, was, on the forenoon of the 12th August, 1895, at work in the burning sun, when he suddenly fainted. This was followed by frequent diarrhœa, which greatly exhausted him, accordingly at 11 p.m. he applied for medical help. On examination, his mind was in a dreamy state; the countenance presented signs of distress, complaining of agony in the chest, the bodily temperature indicated 38.°3 C., with cold sweat, the lower extremities cold, the pulse was thready and frequent, reaching 140 in the minute. The tongue was coated with thin fur and dried, thirst intense. Appetite was lost, and the abdomen gurgling. Diarrhœa occurred five times, the evacuation being a yellowish watery character, urine normal. Brandy was given, and on the forenoon of the 13th following, the patient was sent to the Kure Naval Hospital. When admitted, his body temperature was 39.°4 C ; the eye-balls were found slightly sunk, the forehead covered with a cold sweat, the pupils somewhat contracted; the pulse was feeble and frequent counting 150, thirst was intense. No pain and tenderness in the abdomen, diarrhœa stopped. It was diagnosed as a case of sun-stroke, accordingly stimulant, ice, and stomachic mixture with opium were administered. But the symptoms did not improve in the least. About 5 p.m., an increased distress set in suddenly, and the patient rolled about in agony ; the pupils became contracted, their reaction being dull, the eye-balls grew fixed and drawn upward, the pulse was too weak to count. The temperature rose to 41.°4 C., and every possible effort proving of no avail, the patient succumbed to the attack on 8 p.m., of the same day.

Another patient had a mild attack, and was able to leave hospital completely recovered after 29 days.

(4) OTHER CONSTITUTIONAL DISEASES.

Among seventy three cases of this category are included constitutional diseases of short duration like simple continued fever. The total days' sickness was 1707, giving an average of a little upwards of three weeks for each case. As regards their termination, seventy one cases recovered, one resulted in death, and one was still running its course. The death was due to malignant anæmia.

3.—DISEASES OF THE NERVOUS SYSTEM.

(1) MENTAL AFFECTION.

Fourteen cases were returned for this group. Three of these being recurrences, the actual number of persons affected was eleven for the fourteen cases. Eight persons recovered, five were invalided, and one was still under treatment. The diseases, classified, were, five cases of melancholia of which, two were caused by anxiety about family affairs, one by undue excitement on seeing a magic lantern, two from unknown cause recurring in the same person ; six cases of mania of which four were acute, occurring in two persons, and the other two were chronic ; one each of dementia, paralytic insane, and hypochondriasis. Classified according to ranks, they were two petty officers, four seamen, four stokers, and one cook. Considered from the date of their occurrence, they had no direct relation with the battles of the Yellow sea and Wei-hai-wei, most of them happening after the occupation of Wei-hai-wei in the year 1895. In 1893 (time of peace), ten persons were affected with mental disease, and therefore the above mentioned fourteen cases showed no sensible increase on ordinary years. So we may say that our Navy had no special large number of mental affection on account of the war.

(2) DISEASES OF THE PERIPHERAL NERVES.

For this group, twenty two cases were returned. To enumerate them:—Seven cases of sciatica, three of the facial paralysis, one each of the facial neuralgia, paralysis of the external rectus of the left eye, paralysis of the musculo-spiral nerve, paralysis of the ulnar nerve, and lumbago, four cases of the disorder of sensibility of the lower limb, one each of rheumatoid neuralgia, general hyperœsthesia, and traumatic neuralgia of the upper limb. Fifteen of these cases were cured, and two were invalided; that is, the cases of sciatica and that of traumatic neuralgia of the left arm; and five men still under treatment, viz: one each for rheumatoid neuralgia (which ran a course of 408 days, the longest that occurred during the war), sciatica, paralysis of the ulnar nerve, paralysis of the external rectus of the left eye, and general hyperœsthesia.

(3) OTHER NERVOUS DISEASES.

Twenty cases are given under this heading, enumerated as follows:—One each case of cerebral tumour and cerebral syphilis resulted in death, cerebral congestion (six, of which five recovered and one remained under treatment, headache (three cured and one remaining), one each case of hemicrania, cerebral concussion, insomnia, paralysis of hypoglossal nerve, coccygeal neuralgia and lumbago recovered, one case of disease of spinal cord invalided and one of hemiplegia remained under treatment.

4.—DISEASES OF THE RESPIRATORY SYSTEM.

(1) PULMONARY TUBERCULOSIS—PLEURISY AND THEIR SEQUELS.

Of the diseases of the respiratory system, those which claim our special attention are phthisis and pleurisy. Considering the nature of a seaman's duties, these two diseases might reasonably be expected to be very numerous among them. For men on naval service in performing their duties, have always to fight with storm and billows, and frequently to expose themselves to sudden changes of temperature. For instance, the stoker who is all sweat at work in the heated engine-room will expose himself on the deck to the cold wind, which will instantly suspend the function of the skin. Such practice may well prove to be a cause of the diseases under consideration. It will be seen that life on board a ship is all the more liable to these diseases, when we call to mind the insufficiency of space, the lack of light, and bad ventilation, as compared with the surroundings of the landsman. The diseases that are found to be most numerous in our navy are venereal diseases and wounds, and next to them rank phthisis and pleurisy. Judging by the number of deaths, (infectious diseases excepted), the diseases under question come foremost, they furnish also the most numerous instances of invaliding.

The following table shows the number of cases of phthisis for each year from 1884 to 1899:—

Year.	New Cases.	Ratio of New Cases per 1,000 force.	Deaths.	Ratio of Deaths per 1,000 force.	Invalided.	Ratio of Invalided per 1,000 force.
1884	31	5.50	9	1.60	11	1.95
1885	30	4.34	6	0.87	6	0.87
1886	26	3.07	13	1.53	13	1.53
1887	31	3.40	16	1.76	14	1.54
1888	33	3.59	10	1.09	21	2.29
1889	33	3.69	8	0.88	21	2.35
1890	41	4.50	12	1.32	19	2.09
1891	73	7.14	17	1.66	40	3.91
1892	54	5.54	12	1.23	33	3.39
1893	61	6.54	8	0.86	37	3.97
1894*	68	6.18	7	0.64	42	3.82
1895*	71	5.46	12	0.92	40	3.08
1896	101	7.75	23	1.76	57	4.37
1897	161	10.76	17	1.13	94	6.28
1898	168	9.12	17	0.92	122	6.62
1899	123	6.29	10	0.51	97	4.96

* The years of the war.

As this table shows, cases of phthisis show no particular increase during the years of the war, but they gradually began to increase from the following year, and showed a remarkable increase in the year 1897, with a consequent increase of invalidings and deaths. In June of the same year, Mr. Y. Saneyoshi, Director of the Sanitary Bureau issued instructions on preventive measurers against phthisis, which in consequence of a strict enforcement of these measures abated somewhat. The increase of the number of invalidings was due to the fact that persons suffering from the disease were discharged at an early stage of the affection.

Instructions concerning the Prevention of Phthisis :—Phthisis is a disease caused by special bacilli, and is infectious from one person to another. This can be proved by inoculating its virus on animals, and there have been many cases to prove that infection also takes place with the human body. Phthisis being a chronic infectious disease, its virulent power will only be effective on those who expose themselves often to the virus, or to those who have a constitution susceptible to it. It must not therefore be regarded with the same fear that we have for acute infectious diseases as small-pox and cholera. Nevertheless, as a result of its being universally recognized as infectious, people are apt to look upon it with extreme dread, so much so that they often lose their presence of mind when they come in contact with a patient. We cannot approve of this fear ; never the less, it is important that we should take proper measures for the prevention of the disease. For this reason, we here give, for the consideration of those concerned, a statement of the conditions favoring the infection of the disease, and of the general measures for its prevention.

The Infection of Phthisis :—The infectious virus of a phthisical patient is usually to be found in his spittle, not in his breath nor in the emanation from his skin. It must be remembered that the infection of the disease is chiefly through the spittle of the patient.

The virus of phthisis enters the body either through the respiratory system, or through the alimentary canal. It enters through the respiratory system when the spittle of the patient is dried up, broken into particles, and flies about in the air in the form of dust. It enters the body through the alimentary canal, when the virus is swallowed in a mass with food (especially with raw milk). There have indeed been cases in which the virus has been absorbed through a wound in the skin, but these cases are exceptional. The virus of phthisis does not directly lose its power or life, even when it has been discharged out of the body, and this is particularly the case, where the air and sun-light are badly admitted. Hence the presence of the tubercle bacilli may often be found in the air of a crowded place, where proper hygienic care has not been taken.

The virus in question is most apt to attack those who have a weak constitution, and an undeveloped chest with feeble organs. At the same time, the various diseases pertaining to the respiratory system may easily become a promoting cause.

The Prevention of Phthisis:—As already stated, the virus of phthisis exists in the spittle of the patient, and it is a first requisite that the spittle should be strictly disposed of.

(*a*) Indoors and on board a ship, spittoons made of earthen ware or metal, with a little water or carbolic acid solution in them, should be furnished at suitable places ; and not only phthisical patients and those suspected of the disease, but all other persons should be made to discharge their spittle into these vessels, for the spittle of those who are not suspected of the affection or who do not suspect themselves, may happen to contain the bacilli. Strict care should be taken not to spit on the floor, or the ground ; nor should the paper with which the spittle has been wiped be thrown away at random, for when dried up, the virus may fly about. The spittle received in the vessels should be thrown away at some fixed place. In order to disinfect the spittoons put in them a quantity of soda (that used for washing will well do) equal to that of the spittle, pour in some hot water, and throw the contents away after the water has cooled.

(*b*) The spittoon in special use by a phthisical patient should be made of glass or earthen ware, and be furnished with a cover. For disinfection, boiling the spittle, or subjecting it for an hour to a heat above 80° C. is the surest way, but as this is practically difficult, the following method may be resorted to :—The vessel should usually be provided with 5 per cent solution of carbolic acid, also, when spittle is to be thrown away, it should be well mixed with carbolic acid solution freshly poured in ; or receive the soda disinfection above mentioned.

(*c*) The articles of clothing and utensils used by phthisical patients should be treated apart from those of healthy persons, their food utensils should be washed in hot water ; also their handkerchiefs, bedclothes, and shirts should be washed at times in hot water.

On February 24th, 1898, Mr. Y. Saneyoshi, Director of the Sanitary Bureau, again issued the following instructions about the prevention of phthisis :—" We have already issued instructions concerning measures for the prevention of phthisis, but we see that the number of the patients has been gradually increasing of late, a fact which must be regarded with profound regret. We therefore hereby request the surgeons concerned to pay greater attention to the prevention of the disease.

(*a*) At the bodily examination of seamen newly to be enrolled, the healthy state of the respiratory organs should be made a chief requisite, special heed being paid to the conditions of the chest; persons with a tuberculous constitution, or with a history favorable to the formation of disease should not be enrolled.

(*b*) Patients suffering from phthisis, or suspected of it, should be admitted to hospital, or placed in the wards as early as possible, so that they may be isolated from other healthy persons.

(*c*) Still greater attention should be paid to the cleaning of barracks and ships, and also to the disinfection of the spittle.

(*d*) In case the disinfection of rooms and articles used by phthisical patients be necessary, Articles Nos. 39 and 40 of the Surgeons Service Regulations should be observed as carefully as circumstances will admit."

On October 3rd, 1899, the Minister of the Navy promulgated the following instructions :—" In our Navy, there has been observed of late an increasing frequency in the number of phthisical patients. This is a matter of regret as it is a blow to the strength of our Navy. Now, as phthisis is chronic in its nature, it is infectious in a slow and insiduous way. At its early stage, the symptoms are very obscure, and even when they become apparent, the bodily strength is comparatively little impaired. The sufferer thus often engages himself in service, and even neglects the treatment of the disease, until it is too late for any means of remedy. This may seem a very praiseworthy thing, for he sacrifices his own interests for those of the country. But further consideration will easily show that this is an injury both to the patient himself, and to the others, and to the country ; for the disease insiduously spreads among his company. Such conduct is indeed exactly at variance with the great responsibility of men in the naval service, and must scrupulously be avoided by them. Therefore, from admirals down to seamen, any and every man in the service, whenever they discover themselves showing symptoms of phthisis,—that is, coughing, spitting, rise of body temperature, and decrease of strength—they should directly go and undergo examination of the surgeons, and devote themselves to recuperation. On the other hand, when the surgeons happen to meet such patients, they should examine them with scrupulous accuracy, and persons recognized as undoubted cases of phthisis should be made to apply themselves wholly to the recuperation of their health, and should not be given merely temporary measures of treatment in the intervals of their duties."

Notwithstanding the repeated instructions concerning the prevention of phthisis, and their strict observance, we do not unfortunately see the disease brought under control. Its causes may of course be various, but we are compelled to attribute it mainly to the narrow living space on board ship and torpedo boats. It is well known, the space allotted to the crews at present is exceedingly narrow. This is especially the case with the steerage where men sleep, for on a comprehensive investigation, we find that the average space occupied by each petty officer and seaman is some 102 cubic feet. This is only one-sixth of that allotted to the soldier in the army, who gets about 653 cubic feet per man. It is impossible in the steerage of a warship or torpedo-boat, to make up for the lack of space by means of artificial ventilation. To thoroughly ventilate a space of this kind will cause draughts, and as such ventilation is impossible, a diminution of injurious effects is all that can be expected from ventilation. The rooms on board a torpedo-boat furnish a more striking instance. To work, to talk, to dine, to sleep in narrow places like those on board a torpedo-boat, who can doubt that it is a great cause of the spread of the disease under consideration ? Again, on board a ship, not only is ventilation comparatively imperfect, but also the admission of sunlight is very limited, in some places no light being allowed at all, and as a consequence, the floors, scrubbed with sea-water, require much time before drying. Such being the unhealthy conditions on board a ship or boat, the virus that flies about from the breath of the patient, or the dried virus coming from the spittle with which clothes or other articles may be soiled, will find most favourable conditions of existence. How great the peril is of those who crowd together in such places, the best suited for the preservation of the virus can well be imagined ! The fact that the sea-water does not easily destroy the life and virulence of the tuberculous bacilli, but on the contrary, is favourable to them, has been well established by numerous experiments. Besides, the sudden and striking changes of temperature to which seamen at large have usually to expose themselves, are far greater than those experienced by men in the army when on march. This also naturally affords a great cause for diseases of the respiratory system, and consequently for phthisis; and this is especially the case with the stokers.

Lastly, a ship's crew will often go on shore, and lodge at private houses, and indulge in drinking and other unhygienic practices. This greatly diminishes the resisting power of the body, and thus opens the way for the entrance of the bacilli, which is almost the same as promoting the power of the virus. These heedless practices of the men must be regarded as another great cause of this dreadful disease. Even those who are ordinarily good in deportment, and do not indulge in such unhealthy practices, are apt to lodge at various houses, and otherwise expose themselves to unfavorable circumstances as naval men lead a more unsettled life than men belonging to the army.

In the Navy of Great Britain, the increase of phthisis of late has attracted the notice of several persons. For instances, Captain Rason, R. N., has aroused public attention by writing to the Times, and in 1890 Christopher Harvey, Fleet-Surgeon, R. N., sent a report based on his investigations to the Naval and Military Record. In that report, he writes about bad ventilation and insufficient space in the same way as we have done; and we take the liberty of quoting from it below :—

" If, then, we have reasonably eliminated the undue effect of climatic influences, always more or less prevailing, to what occult causes can we attribute the undeniably large proportion of lung disease on board training-ships? The hygienic surroundings of a ship, even under the most favourable circumstances, must be very imperfect when compared with establishments on land. There is the necessary crowding together of numbers of people in a small space, and the fact that in these training-ships the boys sleep, eat, work, and play all in the same place, whilst the sanitary arrangements—meaning thereby the arrangements for washing and tubbing the boys, the latrines for themselves, officers, and men, the washing and scrubbing of decks and of clothing, even to the drying of the latter, and the cooking appliances of the ship's company are influences decidedly prejudicial to health. In large public schools these faulty methods do not exist, the schoolrooms, dining halls, dormitories, playgrounds, kitchens, lavatories, &c., being separate and distinct. Ventilating and drying arrangements, too, are defective, although, no doubt, the best that can be obtained under the circumstances. I do not refer to this in any deprecatory spirit, but solely from my standpoint as a medical officer, for I must, and with pleasure, admit that I always found on the part of the responsible officers on board that every effort was made to carry out any suggestions of the medical officer which he considered likely to improve the health of the boys. It is impossible to thoroughly ventilate a ship without causing draughts. The boys sleep in hammocks in three layers of decks, one over the other, and these hammocks are triced up to within a few inches of the beams. The foul air thus has a tendency to accumulate between the beams, and so to be inhaled over and over again, and then, when it does escape, it largely passes into the decks above. Numerous openings at night are not advocated because of the difficulty of managing them, and of their tendency to create draughts, letting in wind, rain &c. Thus the decks are contaminated, the boys become more or less enfeebled, and fall an easy prey to diseases of the respiratory organs, which under more favourable hygienic surroundings would not have affected them.

Thus it is to overcrowding, or, if the expression be preferred, to imperfect ventilation, that I attribute the remote cause, and to the climatic influences the immediately exciting cause of diseases of the lungs on board the Lion."

(2) OTHER DISEASES OF THE RESPIRATORY SYSTEM.

Under this group, there were 42 cases, of which 34 were of hæmoptysis. If we consider that phthisis is generally a concomitant of hæmoptysis, these 34 cases of hæmoptysis may reasonably be counted under the heading of phthisis. However, as they are reported only as hæmoptysis, we group them here under a separate heading. Further, if we take into account the fact that the total number of days' sickness of these 34 cases was 1682 which gives over 40 average days per case, it is clear that they all took a chronic course. Therefore, if these 34 cases were classed under phthisis, the ratio of phthisis per 1,000 force mentioned in the foregoing table would greatly increase.

5.—DISEASES OF THE CIRCULATORY SYSTEM.

The number of cases comprised under this group was only 44 in all. The 5 cases of valvular diseases were as follows :—1 case of regurgitation of the mitral valve which ended in death, 1 case of mitral stenosis which was still under treatment, 3 cases of regurgitation of the aortic valve, of which 1 being a recurrence was convalescing for a time, but finally ended in death at the hospital, the other two also resulting in death. All these cases occurred among combatants; that is, 1 seaman, and 4 petty-officers, with one of whom the disease was recurrent.

The other heart diseases, numbering 12, were mostly cases of palpitation, which totalled 10 cases; and as for their termination, 9 were either completely recovered or relieved, 1 was still running its course, and of the remaining 2 cases, 1 which was endocarditis was invalided, and the other succumbed to paralysis of the heart. In short, the diseases of the circulatory system are by far the least in number as compared with those pertaining to other systems. Aneurism which is thought by some to be frequent with seamen whose labor is very hard, was seen only in 2 cases, one of which was an aneurism of the thoracic aorta occurring in a petty officer 28 years old, and the other an aneurism of the femoral artery in a seaman of 31 years old.

6.—DISEASES OF THE DIGESTIVE SYSTEM.

Under this head appeared 623 cases in all, of which 221 cases were intestinal catarrh. Before enquiring how it was that so many cases of the latter affection were produced, we think it convenient to show by a table the general condition of their occurrence.

INTESTINAL CATARRH.

	Vessels abroad.	Transports.	Land service abroad.	Vessels at home.	Land service at home.
No. of vessels or stations affected in 1894............	11	2	...	2	7
No. of vessels or stations affected in 1895............	26	1	6	2	8
No. of cases in 1894.	15	2	...	2	19
No. of cases in 1895.	143	2	15	2	21

Months in which cases occurred.						
January ...	1894	...	...	...	...	...
	1895	4	...	2	...	...
February ...	1894	...	...	...	...	...
	1895	1	...	...	...	1
March ...	1894	...	...	...	...	...
	1895	1	...	...	...	...
April	1894	...	...	...	...	...
	1895	2	...	...	...	...
May	1894	...	...	...	...	...
	1895	7	...	1	...	...
June	1894	...	...	...	...	...
	1895	16	...	2	1	...
July	1894	2	...	...	...	...
	1895	63	...	8	1	1
August ...	1894	2	2	...	1	4
	1895	16	...	2	...	12
September ...	1894	8	...	...	1	7
	1895	23	2	1	...	4
October ...	1894	1	...	...	...	1
	1895	10	...	...	...	1
November ...	1894	1	...	...	...	3
	1895	...	...	...	...	1
December ...	1894	1	...	...	...	4
	1895	...	...	...	...	...

Viewed from this table, it will be seen that the disease occurred in the largest number in the 4 months of June, July, August, and September, 1895. At this period, the fleet was mostly abroad in the waters of Formosa. In that region, in the summer-time, it is extremely hot during the day time, while it suddenly becomes pretty cool at night, so that the difference of temperature between day and night is considerable. On investigating the temperature of the said period according to a weather record furnished by the Naniwa and Yoshino then on service in those waters, we find as follows :—

Month.	10 a.m.	4 p.m.	10 p.m.	Average.
June	82° F.	87° F.	84° F.	84° F.
July	84°	99°	86°	90°
August	83°	87°	84°	84°.7
September	80°	83°	78°	80°.3

As seen in this table, the difference of temperature between day and night, was greatest in the month of July, and the number of the patients was also the largest in the same month. This shows that rise and fall of temperature has much to do with the production of the disease in consideration. Also, drinking of water to cure thirst produced by intense heat must be regarded as another cause. Besides, we had a new cause in the food procurable, for while on the expedition, the ships' members could not have the same fresh articles as they had at home, but were compelled to take such food as biscuits and tinned meats, which unquestionably proved injurious to the stomach and intestines, and consequently were a cause of the disease under question. 77 cases of gastric catarrh and 32 cases of indigestion seem to have been produced by one and the same cause.

7.—VENEREAL DISEASES.

Venereal diseases show a high percentage, so much so that no fewer than one-third of all the diseases attacking the ships' crews belonged to this class. Men on naval service are most of the time, confined within the shell-world of a ship, or a boat, and when they happen to call at, or make a stay at a port, and have occasion to go ashore, they are naturally apt to take to drinking and to seek the pleasure of spending a night at a house of debauchery. This is indeed a regretable fact, but it is the case, not only with our men, but equally with those of every navy, the medical reports of each navy showing that venereal diseases stand in by far the highest ratio. In our country, brothels are licensed, and medical examination is strictly carried out everywhere twice a week under the police regulations, and women who are recognised to be suffering from the disease are placed in lock hospitals, where they are given satisfactory treatment, so that almost nothing is left undone in this line, but unfortunately wherever this system of licensed brothels exists, there are found also private brothels. Quite unlike the licensed ones, these private brothels are scattered over the whole city, and their owners are very clever in hiding themselves from the eyes of the police, and even when hunted up, will again begin before long to open their doors. At various naval ports where the police keep especially strict watch against them, they are just like the harassing flies that come and go. They are indeed a great enemy of the public health. With a view to extirpating this evil, the authorities of our navy have from time to time consulted with the surgeons about preventive measures against venereal diseases, yet no evident result has been achieved.

During the war, we saw no remarkable increase in the number of patients belonging to this category, but after the war when the force returned in triumph, they took the liberty to indulge in immoral pleasures, perhaps with a view to recuperate themselves for the hardships of the expedition, and were tempted to approach these brothels. The total number of cases of this disease was 2165. The average daily number of the new patients was 4.5, the ratio being 151.82 per 1,000 force.

Out of shame and with a view to avoid being prohibited from going ashore, patients suffering from venereal disease are disposed to keep the matter a secret. In order to prevent this evil, in our navy, a bodily examination of the seamen is made once a month, and a tabular report is forwarded to the Director of the Sanitary Bureau. And for the purpose of promoting the sense of self-respect among our men, the wages due to those under treatment for the wounds and diseases in the hospitals are divided into the following four classes :—

The first class :—the whole sum of the wages are given to the patients suffering from wounds or diseases obtained in discharging their duties.

The second class :—eight-tenths of the wages are given to patients suffering from wounds or diseases not belonging either to the first, third, or fourth class.

In the third class :—four-tenths of the wages are given. This class includes :

(*a*) Venereal diseases—gonorrhœa, epididymitis, chancres, bubo, and constitutional syphilis (the third stage excepted).

(*b*) Wounds or diseases which are caused by such evidently unhealthy practices as drinking or eating to excess.

(*c*) Diseases incurred by direct violation of instructions given by superior officers.

The fourth class :—one-fifth of the wages are given to those patients who are suffering from wounds or diseases intentionally inflicted or incurred.

Besides, a seaman affected with venereal disease is prohibited from going ashore during its course and for a week after recovery, in order to prevent infection to others.

8.—DISEASES OF THE CUTANEOUS SYSTEM.

The increase of the cutaneous diseases like carbuncle, and inflammation of the areolar tissues during the war, was due to the fact that the men kept their bodies unclean, owing to the insufficient supply of fresh water, which prevented them from bathing as usual. Sea-water baths were indeed often ordered, but the men hated the disagreeable sensation felt after such baths if not cleaned afterwards with fresh water and most of them refused to take such baths. Also, the frugal use of fresh water did not allow the needful washing of their clothing, and consequently they were often obliged to keep on garments soiled with the sweat of many weeks. This partially accounts for the prevalence of the diseases under consideration.

9.—WOUNDS.

Wounds incurred outside of action were 838, of which 15 resulted in death; the ratio of the wounds per 1,000 force being 58.76. The injuries that occurred in largest numbers were contused wounds (402), contusions (162), burns and scalds (80), incised wounds (43), frost-bites (34). Contused wounds, contusions, and incised wounds occurred in the largest number during the five months from August to December, 1894, and burns and scalds also were produced in comparatively large numbers during the same period. As for the places of occurrence, most of them took place on board the ships abroad. Most of the frost-bites were produced between November of the same year, and the February following. Abroad, the Hiyei, and at home, the Sasebo Barracks had the largest number of frost-bites. With the exception of frost-bites, all the wounds above mentioned must be regarded as results of over-work. For, even after the victory of the Yellow Sea, our fleet mounted guard over the seas, without being off duty a day, and this must have been a cause why so many wounds were produced. The cases of frost-bites in the fleet abroad were twice as numerous as those at home. This was because the cold on the seas abroad was unexpectedly severe. However, owing to scrupulous precautions taken for the prevention of cold, fortunately we had a comparatively small number of cases.

As for diseases of the organs of the special senses, we noticed no phenomena different from those of ordinary years. They are not worthy of our readers' attention, and we shall not treat of them.

TABLE OF DISEASES AND INJURIES DURING THE WAR (FROM JULY 25TH 1894 TO NOVEMBER 17TH 1895) EXCLUDING INJURIES CAUSED BY THE WAR.

Average of the force during the war was as follows:

Petty officers—2218.73 Men—11,727.49 Employés—314.02

Total Force 14,260.24

Diseases or Injuries.	Cases.	Recovered.	Died.	Invalided.	Remained on the last day.
General diseases.					
Measles	5	5	...	...	...
Varicella	1	1	...	...	...
Enteric Fever	71	40	15	...	16
Cholera	89	39	49	...	1
Malarial Fever	146	127	6*	...	13
Dysentery	71	64	5	...	2
Influenza	37	37	...	...	...
Erysipelas	3	3	...	...	...
Acute Articular Rheumatism...	56	50	...	...	6
Chronic Articular Rheumatism	7	6	...	...	1
Kak'ke	40	34	3	...	3
Leprosy	3	...	...	3	...
Morphine Poisoning	1	...	1	...	...
Chloral Hydrate Poisoning	1	1	...	...	...
Caustic Soda Poisoning...	1	1	...	...	...

* 5 deaths out of the 6 in malarial fever were afterwards confirmed to be due to Enteric fever but at the time of deaths on board the Yamato diagnosis was not certain and the death certificates were reported as such.

Diseases or Injuries.	Cases.	Recovered.	Died.	Invalided.	Remained on the last day.
Sun-stroke	2	1	1	...	...
Other diseases	73	71	1	...	1
Total	607	480	81	3	43
Diseases of the Nervous System.					
Mental Affections	14	8	...	5	1
Epilepsy	6	3	...	3	...
Diseases of Peripheral Nerves	22	15	...	2	5
Cerebritis and Meningitis	4	...	3	...	1
Cerebral Hæmorrhage	4	...	4	...	...
Myelitis & Meningitis Spinalis	5	1	1	1	2
Hydrophobia	1	...	1	...	...
Other diseases	20	13	2	1	4
Total	76	40	11	12	13
Diseases of the Respiratory System.					
Nasal Catarrh	59	59	...	...	...
Laryngitis	38	38	...	...	...
Bronchitis	104	102	...	...	2
Asthma	2	1	...	1	...
Pneumonia	29	26	1	...	2
Pulmonary Tuberculosis	103	20	11	49	23
Distomum Pulmonalis	3	3	...	...	...
Pleurisy & its Termination	153	118	1	7	27
Other diseases	42	39	...	...	3
Total	533	406	13	57	57

Diseases or Injuries.	Cases.	Recovered.	Died.	Invalided.	Remained on the last day.
Diseases of the Circulatory System.					
Valvular diseases	5	1	3	...	1
Other diseases of the Heart	12	9	1	1	1
Diseases of the Vessels and Lymphatics	2	2	...	...	...
Aneurism...	2	...	1	1	...
Diseases of Lymphatic Glands	23	19	...	...	4
Total	44	31	5	2	6
Diseases of the Digesive System.					
Diseases of the Teeth and Their Sequels	1	...	...	...	1
Tonsillitis...	33	32	...	...	1
Pharyngitis	50	50	...	...	...
Other diseases of the Mouth and Pharynx	10	9	...	1	...
Diseases of the Salivary Glands	2	2	...	...	...
Gastric Catarrh	77	71	...	1	5
Gastralgia	10	10	...	...	...
Dyspepsia	32	31	...	...	1
Catarrhal Enteritis...	221	217	2	...	2
Intestinal and Omental Hernia	10	7	...	2	1
Typhlitis and Peri-typhlitis	16	15	1	...	...
Intestinal Parasites...	1	1	...	...	...
Catarrhal Jaundice...	31	28	...	...	3
Peritonitis	7	2	4	...	1
Rectal Fistura...	24	22	...	...	2
Hæmorrhoids	47	24	...	...	5

DISEASES OR INJURIES.	CASES.	RECOVERED.	DIED.	INVALIDED.	REMAINED ON THE LAST DAY.
Diseases of the Rectum and its Surroundings	28	28	...	..	...
Other diseases	23	18	3	...	2
Total	623	585	10	4	24
Diseases of the Genito-urinary System.					
Parenchymatous and Interstitial Nephritis	9	8	1	...	...
Cystitis	28	22	...	...	6
Diseases of the Prostate Gland	2	1	...	...	1
Stricture of the Urethra...	6	3	...	1	2
Diseases of the Prepuce	4	4	...	...	...
Diseases of the Testis and Epididymis ...	203	194	...	1	8
Hydrocele...	4	4	...	...	...
Other diseases	26	23	...	...	3
Total	282	259	1	2	20
Venereal diseases.					
Gonorrhœa and its Sequels	310	300	...	...	10
Soft Chancre	820	758	...	...	62
Hard Chancre...	150	133	...	...	17
Bubo...	683	551	...	...	132
Syphilis	202	183	...	1	18
Total	2165	1925	...	1	239
Diseases and Injuries of the Eye.					
Diseases of the Eyelids	5	5	...	...	...
Infectious diseases of the Conjunctiva ...	47	40	...	1	6

Diseases or Injuries.	Cases.	Recovered.	Died.	Invalided.	Remained on the Last Day.
Non-infectious diseases of the Conjunctiva	53	52	...	...	1
Diseases of the Sclerotic and the Cornea	37	31	...	1	5
Diseases of the Lens	3	2	...	...	1
Diseases of the Iris...	13	11	...	...	2
Diseases of the Retina and Optic Nerve	6	3	...	...	3
Anomalies of the Refraction and Accommodation	4	1	...	2	1
Injuries of the Eye...	10	4	...	2	4
Other diseases and injuries	8	7	...	1	...
Total	186	156	...	7	23
Diseases of the Ear.					
Diseases of the External Auditory Canal	8	8	...	...	...
Rupture of the Membrana Tympani ...	25	17	...	3	5
Diseases of the Middle Ear	4	3	...	...	1
Other diseases...	6	2	...	1	3
Total	43	30	...	4	9
Diseases of the Skin and Connective Tissues.					
Scabies	60	51	...	...	9
Eczema	33	32	...	...	1
Ringworm	11	10	...	...	1
Ulcer	69	65	...	...	4
Cellulitis and its Sequels	174	164	1	...	9
Furuncle and Carbuncle...	122	122	...	...	...
Paronychia	24	23	...	...	1

Diseases or Injuries.	Cases.	Recoverd.	Died.	Invalided.	Remained on the Last Day.
Benign Tumours	11	9	...	...	2
Other diseases...	12	11	...	...	1
Total	516	487	1	...	28
Diseases of the Organs of the Locomotion.					
Ostitis and Periostitis	23	18	...	...	5
Arthritis	24	16	1	1	6
Muscular Rheumatism	42	40	...	...	2
Ankylosis...	1	1	...	...	...
Other diseases of the Muscles	9	8	...	1	...
Diseases of the Tendon and Synovial Sheaths	1	1	...	...	...
Other diseases...	2	1	...	1	...
Total	102	85	1	3	13
Injuries.					
Incised wound...	43	41	...	...	2
Contusion...	162	150	2	2	8
Contused wound	402	383	...	3	16
Lacerated wound	10	7	...	...	3
Punctured wound	9	8	...	...	1
Gunshot wound	8	4	3	...	1
Bit wound	3	3	...	...	...
Explosion wound	8	7	...	...	1
Burns and Scalds	80	70	6	1	3
Frostbite	34	33	1	...	...

Diseases or Injuries.	Cases.	Recoverd.	Died.	Invalided.	Remained on the Last Day.
Fracture of the Forearms	2	2	...	...	...
Fracture of the Hand	15	10	...	1	4
Fracture of the Femur	5	1	...	2	2
Fracture of the Leg	5	2	1	2	...
Fracture of the Foot	3	2	...	...	1
Fracture of the Skull	2	...	2	...	...
Fracture of the Face	3	3	...	...	...
Fracture of the Clavicle	10	10	...	...	...
Fracture of the Rib...	2	2	...	...	...
Fracture of the Spine	1	1	...	...	...
Fracture of the Pelvis	1	1	...	...	...
Sprain of the Joints of the Upper Extremity	1	1	...	...	...
Sprain of the Joints of the Lower Extremity...	4	3	...	...	1
Dislocation of the Shoulder Joint ...	5	5	...	...	...
Dislocation of the Wrist Joint	1	1	...	...	...
Dislocation of the Hip Joint	1	1	...	...	...
Other injuries	18	17	...	...	1
Total	838	768	15	11	44
Other Diseases and Injuries.					
Drowning...	29	...	29	...	...
Self-mutilation	1	1	...	...	...
Suicide	2	...	2	...	...
Hanging	3	...	3	...	...
Total	35	1	34	...	...
General Total	6050	5253	172	106	519

CHAPTER VIII.

SANITARY CONDITIONS DURING THE WAR.

When the fleet was first despatched on the expedition, the hot season was approaching ; her destination was the coasts of China and Korea, which abound in unhealthy places, some of which are visited by dysentery and variola all the year round, and others where malarial fever is prevalent. In considering the past experiences of foreign troops sent on expeditions, we find it is almost a rule that the number of men falling victims to diseases is double that of men killed in action. This fact has caused great anxiety to those concerned in sanitary affairs. Our Navy, in consequence of the late improvement in diet, has succeeded in remarkably diminishing the number of diseases, and bettering the constitution of the men. Kak'ke which is the most formidable of all the diseases in the East, having been placed under control, the general health of the Naval service, was at that time incomparably better than it had been before. Nevertheless, some apprehension was felt as to the sanitation during the war, and the sanitary authorities accordingly formed a new plan of sanitation to be resorted to during the war, based on experiences obtained from the then existing regulations and methods of sanitation. Everything pertaining to it,—that is, selection of food and drink, washing of garments, airing of things, drying, ventilation, the warming of apartments, and cleaning, as well as the degrees of work, methods of recreating the mind, and guarding against prevailing disease, etc.,—was strictly observed in accordance with the rules and regulations fixed in the said plan, except in cases where we might be forced to deviate from them owing to special circumstances.

1.—DIET.

In our Navy, the allowance for a day's ration per man was 18 cents, which were paid in cash to ships or barracks up to the year 1884; as a consequence, food was chosen in respective ships and stations as was thought proper and convenient. Thus, there could be no uniform system of diet, except that they all agreed in the point of having Japanese cookery, mixed with European. But the frequent occurrence of kak'ke having reminded the authorities of the inadvisability of Japanese food, on January 15th, 1884, the articles to be used as food were officially fixed as follows:—

Rice
Bread
Biscuit
Beef (fresh or preserved).
Salt beef
Salt pork
Fowls and Eggs
Fish

Miso
Soy
Vegetables (Potatoes, carrots, rape, onions and the like).
Peas and beans
Wheat flour
Tea
Fats and oils (Tallow, lard, butter, olive and sesame oil).
Sugar

Milk
Vinegar
Condiments
Liquors
Salt
Pickled vegetables

In case some of this food could not be obtained, similar articles might be used instead.

On the 2nd, February following, Mr. Takaki, then Director of the Sanitary Bureau, fixed the day's ration to be allowed to each man in accordance with the above regulations, and notified the respective ships and stations on the 6th following.

TABLE OF DAILY RATION.

Rice (may be replaced by 20 oz. of bread or 16 oz. of biscuit).	22.5 ounces.	Fat and oil	½ oz.
Meat (If eggs are used, one egg shall be counted to weigh 10 drams).	10 oz.	Sugar	2.5 oz.
Fish (in default of fish, 2.5 oz. of meat may be substituted).	5 oz.	Milk (1.5 dram of condensed milk may be substituted).	1.5 oz.
Miso	1 oz. 6 drams.	Vinegar	2 drams.
Soy	2 oz.	Spices	18 grains.
Vegetables	15 oz.	Liquor (this is the quantity of Japanese *sake*, if other liquor is given, the quantity shall be fixed in proportion to the alcohol contained therein).	3 oz.
Peas and beans	1.5 oz.	Salt	2 drams.
Wheat flour	2.5 oz.	Pickled vegetables	2.5 oz.
Tea	2 drams.	Fruit	(fresh shall be given).

The above make a total of 71 oz. 18 grs. from which 6 oz. 3 drams, quantity of liquid being subtracted, 64 oz. 5 drams 18 grs. (when rice is used), 62 oz. 1 dram 18 grs. (when bread is used), or 58 oz. 3 drams 18 grs. (when biscuit is used) shall be the quantity of substantial food.

This quantity may not necessarily be allowed every day, but in the course of two weeks the average day's quantity shall come up to this amount.

Thus, the foundation of a new scale of diet was laid, which has since then been in operation. However, the old system of allowing in cash remaining in force as before, when the price of commodities rose, it proved difficult to buy the fixed quantity of food. Consequently, on February 12th, 1890, the Naval Diet Regulations were promulgated, followed by a by-law concerning the supply. These were made public on March 28th, and thus the old system was done away with for the new system, which was put in force from April 1st of the same year. During the present war, therefore, diet was supplied in accordance to the new regulations.

According to the regulations, the following quantity of diet is the maximum, which is to be allowed to a man per week :—

Bread	157.5 oz.	Dried or fresh vegetables	175 oz.
Cereals	112.5 oz.	Meat or fish	115 oz.
Tea or roast barley	5. oz. 2 drams.	Soy, vinegar or oil	24 oz.
Sugar	17.5 oz.	Salt	6 oz. 2 drams.
Fat	3 oz. 6 drams.	Pepper, mustard, or the like	½ oz.

In time of war, the weekly ration shall be increased by one third, as a maximum.

In cases of wound or disease, a nutritious diet suitable to the cases shall be substituted for the rations above mentioned.

After unusual hard work, or when found needful from a sanitary point, 3 ounces of spirit per day as a maximum quantity shall be given to each man, besides the above stated articles of diet.

These are the principal regulations of our Navy concerning rations ; and now the diet is divided into two classes :—(a) the diet for ships on a voyage ; (b) the diet for the same at anchor and land stations. The former chiefly consists of preserved articles (biscuit, preserved meats, and dried vegetables), and the latter chiefly of fresh articles. Ships on a voyage are not necessarily to be supplied only with preserved articles, but they have also to be provided with fresh ones as much as can conveniently be carried. In time of war, men in service will be put to double the usual work as they naturally have to be on duty day and night, and in consideration of this circumstance, on August 6th, 1894, the Commander in Chief made the following announcement in accordance with the Regulations of the Naval diet.

" If an increase in the amount of diet be necessary, one-third of a week's supply (not including rice) shall be allowed in addition to the usual quantity but in any case of decrease or of increase of the fixed amount of diet, the relative proportion of nutritious ingredients contained in the ration per man,—that is, 1 of nitrogen to 13 of carbon—shall strictly be observed."

Again, according to Article No. 10 of the Dietetic regulations, members of a table company are allowed to receive per every five persons, one man's allotment in money, with which they can buy whatever articles they choose. Now, as rice has no less claim than other articles to be placed among articles of their liking, it was much bought by men in every ship, and naturally the fixed amount of rice became liable to be freely changed, and there was fear that this article should be used in excess, which might induce kak'ke among them. Notice was therefore given to the fleet that the quantity of rice that might be taken by a man in a day should not exceed 12.5 oz.

Every possible care being taken in all ships about food, such as were apt to become distasteful through continued use were replaced by others not mentioned in the regulation. For instance, biscuit was replaced by barley which was given boiled with rice; preserved boiled beef and roast beef which the men got tired of were replaced by salt beef and pork, preserved beef boiled with Japanese soy, and *tsukudani* of beef and fish, salt salmon and dried fish, and dried vegetables were replaced by tinned vegetables, melon pickled in *sake* lees, and salted plums. The preserved articles of food supplied during the late war, which could be used for a comparatively long time without the men tiring of them were corned-beef, tinned salmon, and *tsukudani* of beef; and of these the corned-beef was much preferred. Unhappily, *tsukudani* of beef did not keep well, not being prepared or suitable for hot weather.

With regard to salmon, some contended that it soon became unpalatable, others argued that as it could be greatly varied in cooking it could be eaten frequently. Preserved roast beef and boiled beef lost their taste with most persons. Tinned vegetables were all found good, consisting of dock, carrots, edible mushrooms, bamboo sprouts, beans and turnips. The food preferred by most of the seamen was boiled rice, fresh meat, and fresh vegetables. The fresh vegetables and fruit which kept best and were most relished by the fleet during the war were as follows:—potatoes, onions, pumpkins, winter-melons, egg-plants, cabbages, sweet-potatoes, edible roots, dock, carrots, lotus-roots, water-melons, summer oranges and pumelos. Beef, fowls (alive), and eggs were much used. Live cows and oxen were once conveyed by war-ships and transports, but not only did they require a great quantity of water and hay, but in bad weather they often got sea-sick, became emaciated, and succumbed. In the late war, our Army and Navy being constantly victorious, our communication by transports was very easy, and accordingly fresh food was sent from home from time to time. Even at the time when communication was interrupted, it was not difficult to obtain food at the front, and the men were never confined to the exclusive use of tinned meats longer than a month. So in no case did we find that the health of the ship's company was impaired by the use of tinned food. There were naturally a few cases of loss of appetite owing to the monotony of the food and also a few cases of indigestion, especially among those who were already suffering from dyspepsia. This seems to have induced a few cases of kak'ke, for we have reports from some ships to this effect. Also, according to certain reports, numerous eruptions of boils were attributed to the altered state of blood consequent on the lack of fresh food, but we think this was more probably due to an unclean state of the skin caused by insufficient washing during the hot season.

The following tables show the average daily amount of food articles rationed to each person during the late war by the ships belonging to the fleet, and a comparison with rations in foregoing years.

The average daily amount of food articles rationed to each person during the war was as follows:—

FROM JULY TO DECEMBER, 1894

Articles.	Amount.	Articles.	Amount.
Biscuit	12 oz.	Wheat flour	1.5 oz.
Bread	4 oz. 2 drams	Dried fruit	2 drams
Preserved meat	4 oz.	Tea	1.5 drams
Preserved fish	3 oz. 6 drams	Roast barley	1.5 drams
Meat with bone	3 oz.	Sugar	1 oz. 6 drams
Fish	6 drams	Pepper	3 grains
Rice	7 oz.	Mustard	9 grains
Peas and beans	1 oz. 2 drams	Japanese soy	6 drams
Vinegar	2 drams	Salt	5 drams
Sesame oil	½ dram	Fats	2 drams
Dried vegetables	1 oz. 3 drams	Total	52 oz. 5 drams 42 grs.
Fresh vegetables	9.5 oz.		

FROM JANUARY TO NOVEMBER, 1895.

Biscuit	8 oz.	Fish	1 oz. 3 drams
Bread	7 oz. 2 drams	Rice	6 oz.
Preserved meat	2 oz. 3 drams	Peas and beans	1 oz.
Preserved fish	2 oz. 3 drams	Wheat flour	1.5 oz.
Meat with bone	4.5 oz.	Dried fruit	1.5 drams
Tea	1 dram	Sesame oil	½ dram
Roast barley	4.5 drams	Dried vegetables	1 oz.
Sugar	1 oz. 3 drams	Fresh vegetables	10 oz. 6 drams
Pepper	½ dram	Salt	½ oz.
Mustard	6 grains	Fats	1.5 drams
Japanese soy	6 drams	Total	50 oz. 1 dram 6 grs.
Vinegar	1.5 drams		

The above tables only show the amount officially allotted. Besides this, there were articles privately bought, or taken from canteens. Not only did these differ for each ship, but we have no detailed reports, and are accordingly obliged to exclude them from the tables. Anyhow, it must be remembered that the amount actually taken by each person was above that here mentioned.

The average daily amount of food for each person for the period of twelve years from 1884 to 1895 is as follows :

Year.	Daily amount of food.	Year	Daily amount of food.
1884	75 oz. 6 drams	1890	55 oz. 3 drams
1885	78 oz. 1 dram	1891	51 oz.
1886	80.5 oz.	1892	50 oz.
1887	70 oz. 3 drams	1893	48 oz. 2 drams
1888	68 oz.	1894 From July to December (war time)	52 oz. 5 drams 42 grs.
1889	74.5 oz.	1895 From January to November (war time)	50 oz. 1 dram 6 grs.

The decrease of the amount of food since 1890 is due to the alteration of the Dietetic Regulations in April of that year, and also to the fact that, according to the revised regulations, when the number of a table company exceeds five, they are allowed to receive, per every five members, one man's allotment in money, with which they can get whatever food they choose, and this amount is excluded from the table.

The amount of each nutritive element of the average daily food for each person for the period of twelve years from 1884 to 1895 is as follows :

Year.	Nutritive Elements.			Total.	Ratio of carbon to one of nitrogen.
	Albuminoids.	Fats.	Carbo-hydrates.		
	m.	m.	m.	m.	
1884	52.17	11.67	206.16	270.00	16
1885	52.43	12.13	211.95	276.51	17
1886	56.73	12.86	204.66	274.25	15
1887	49.70	12.79	185.19	247.68	16
1888	48.57	11.78	177.38	237.73	15
1889	51.46	11.99	191.48	254.93	16
1890	42.44	7.76	147.44	197.64	15
1891	37.42	6.66	141.33	185.41	16
1892	38.74	7.33	144.79	190.86	15
1893	39.37	7.43	146.52	193.32	15
1894 {From Jul. to Dec., war time.	47.72	9.01	174.50	231.23	14
1895 {From Jan. to Nov., war time.	44.37	8.14	157.62	210.13	14

m. denotes *momme*=53 grains Troy.

The decrease in the amount of each nutritive element since 1890 is due to the reason affixed to the last table.

Liquors :—In the Dietetic Regulations, it is provided, first, that when a ship's crew have been unusually hard worked, or when the temperature falls below freezing point, and secondly, when men and officers or non-combatants of the Navy, in stations, schools, hospitals, or prisons, are deemed to have hygienic need, spirits to the maximum quantity of one ounce will be allowed them. Accordingly, in the fleets on the expeditions, liquors were allowed in the following way : during the voyage in stormy weather, after rowing in rough water, coaling, fighting, and in severe cold below freezing point, and at the time of sentinel duty in the dead of winter, 6 ounces of Japanese *sake*, or one ounce of spirits (rum, brandy, or Japanese *shōchū* diluted with water) was officially given. Besides this, as *sake* was presented by friends or sold at canteens, the men were also permitted to use it in limited quantities (about 6 ounces). In this manner, during the expedition, lovers of liquor had the pleasure of taking some every evening, and besides, on Sundays and other holidays they were given a larger quantity of what had been presented by kind sympathizers.

With regard to the use of liquors, we had many opinions in its favour. For, in exposure to severe cold, or heavy rain, the use of spirits stimulates the action of the skin and is a great preventive against catching cold; after severe labour, it recreates strength; when the digestive power is dull during the hot season and the heart gets weakened, it is a stimulant. It also raises the spirits and gives hilarity when on lonely expeditions; and many other benefits can be obtained from the use of liquors. A small number of medical men consider that harm results from it—that is, excessive radiation of bodily heat consequent on the dilatation of blood vessels of the skin, weakening of the resistive power of the body, neglect of work through drunkenness, and baneful effects on the digestive organs and the mind; from these ill effects we are pleased to say that none of our men suffered; this was probably because the liquor was given under strict regulations as to time and quantity.

2.—DRINKING WATER.

On almost all ships, distilled water was made use of for drinking purposes. There were however, a few ships whose distilling apparatus was not perfect, and they had to get fresh water from transports or land. The Yoshino was rich in pure distilled water, for she was furnished with an apparatus consisting of an evaporator that could make over 21 tons during 24 hours; the Naniwa, Takachiho, and

Kongo made 15 tons each, the Hiyei and Chiyoda each about 10 tons; the Takao, Tsukushi, Musashi, Yamato and Katsuragi 5 or 6 tons, which were pure enough for drinking purposes, and all in the same length of time. But on the three ships Matsushima, Itsukushima, and Hashidate, the distilled quantity which was 5 or 6 tons in 24 hours was small in proportion to the number of men on board. It was however ample for drinking purposes, but it was very frugally used for washing, and they had sometimes to get a supply of fresh water from land for miscellaneous use. The Fuso being unable to make distilled water pure and sufficient for use, suffered inconvenience for a time, but afterwards resorting to a donkey-boiler for distillation, they were able to make 4 or 5 tons of pure water in 24 hours, which amount was enough for drinking purposes.

With regard to the Yayeyama, Tenryu, Kaimon, Amagi, Banjo, Oshima, Akagi, Maya, Chokai, Atago, and some others, having no donkey-boiler, they had to distil direct from the main-boiler, and the water thus obtained had an oily smell, with sometimes a saline taste, and the quantity distilled was insufficient. The ship that suffered most from want of drinking water was the Akitsushima. The distilling apparatus of that ship is of the Normandy type, but owing to circumstances, one boiler could not be appropriated specially for distilling purposes, and pure water was difficult to get. Consequently, she had to resort to transports, land, or other ships for drinking water. In this ship, except for drink, water had to be very frugally rationed to officers and men, and there were times when not more than a cupful was given for a day to each officer and man for washing.

The report furnished by Assistant Surgeon I. Yamashina of the Akitsushima says:—"The thing we greatly suffered from during the late war was the lack of drinking water. Distillation in our ship had to be performed by directly conducting the steam of the main-boilers into a Normandy distilling apparatus; and as there were only four main-boilers which had all be applied to the engine during the voyage, no boiler could be used entirely for distilling purpose. As a result, the water obtained smelt of oil, and as we could only use fresh water for the main-boilers the consequence was that the quantity allowed to each person for various uses had to be greatly curtailed, and we were compelled to resort to the water brought by transports, or from the shore. We had to do this for about a year; and we suffered greatly during this time from the want of good drinking water. For instance, during the winter, fresh water was brought in boats from the shore to the ship's side, and as it was being taken into the tank by the hose would freeze. Then we broke the ice, and water began to pass through, but in a short while, it again froze, causing great trouble. At other times we were very glad to get a supply of water from transports, when to our great disappointment, we found that the water was too salt to be used for drinking purposes. It often therefore occurred in our ship that each officer and man could only be allowed one cupful of water a day for washing purposes but notwithstanding this none of us suffered in health from the scarcity of water."

Drinking water sent to the front was from the Naval Station of Sasebo, where it was chiefly taken in from the Sasebo aqueduct, and when that water was scanty, a supply was often obtained from Omura village at the head of Omura Bay. The latter water, however, compared with that of the Sasebo aqueduct, was found to contain a larger quantity of salt.

At the time, when drinking water was taken in on board a transport, the water was never allowed to be placed on board before it was ascertained to be good by the surgeon of the ship, after qualitative examination. Nevertheless, every time the water was re-examined after it was removed to the battleships in the front, there was found an increase of salt therein, so much so that sometimes aqua argenti added to it produced a precipitate. In such cases, the water was never appropriated for drinking purposes but for miscellaneous uses. The increase of saline ingredients after loading into a transport had its origin in her ballast-tank, for it was usual with each transport to fill the said tank with sea-water on her voyage home, and they did not take the trouble to completely cleanse it before loading fresh water again. Afterwards strict care was taken to prevent a repetition of this. Again some water-boats leaked : the water taken into them from a transport became mingled with sea-water if they were long on the sea before transferring their water to a battle ship, and thus the water became unfit to drink.

As stated above, drinking water was first examined when it was taken on board a transport, and again before transferring the water to a battleship ; thus every precaution was taken against using bad water. The only exceptional case was in the Akitsushima, which suffered greatly from want of drinking water, and was sometimes compelled to take in water containing so much salt as to make it unfit for drink. For this reason, in that ship the greatest care was taken, and it was invariably boiled, nevertheless, the water that was once supplied by a transport happening to contain an excess of salt, proved we hear, to be the cause of a temporary prevalence of diarrhœa on board the ship. Save this, there was no ship in which drinking water proved injurious to health.

Drinks for the Stokers:—During the watch, especially in summer, the stokers consumed a large quantity of water, the amount for each varying, during the 4 hours' watch, from 60 ounces to 180 ounces.

The report from the surgeon on the Fuso says : During the voyage, in the months of August and September 1894, 12 stokers on watch for 4 hours in the boiler-rooms, where the temperature was from 108° to 134° F. drank 840 ounces, and 8 persons on watch for the same time in the engine-rooms drank 300 ounces, and during the battle of the Yellow Sea double the quantity was taken in the boiler-room, and one and a half of the said amount in the engine-room.

Excessive use of water like this disturbs the stomach, and it is said that stokers have therefore been more frequent sufferers from stomach disorder than from brain congestion or heat-stroke produced by the intense heat to which they expose themselves during the watch. Accordingly, we tried to reduce the quantity of water, by mixing it with various things for curing thirst,—that is, for acid beverages, tartaric acid, citric acid, lime-juice, dilute muriatic acid, dilute sulphuric acid ; and for demulcent beverages, thin gruel made of rice, and arrow-root mixed with water, and barley water, etc. As to the comparative value of these drinks, the experience of different surgeons did not agree ; at any rate, many equally recognized that acid beverages had a tendency to upset the stomach, and barley water was found drinkable as far its flavour was concerned, but liable soon to get stale in the hot season, and thin rice gruel also had the same defect, besides not being easy to procure at all times. However, with arrow-root, it had only to be mixed with water on use, and not only was it good to the taste, but it had a remarkable effect in curing thirst, so that the amount of drink could be reduced, and there was besides, no fear of injuring the stomach. Again, there were not a few surgeons, who held the opinion that plain tepid distilled water may be used with the best result (in summer time, the water kept in the tank is naturally tepid).

3.—CLOTHING AND BEDDING.

The articles of clothing used in our Navy during the late war were, during the winter, with officers and warrant-officers—a uniform of blue cloth or serge, and an under-vest and under-drawers of flannel or knitted-wool, and a white shirt. With petty-officers and seamen, the ordinary uniform of blue serge, an under-vest of flannel, a vest and under-drawers of cotton ; and besides these, when found necessary, a woollen comforter was allowed to be worn about the chest and abdomen, over the undervest. Also, besides the regular clothing, shirts which were presented by the public were permitted to be worn, together with Chinese shoes. During the hottest season of the summer, the officers and warrant officers wore the summer uniform of white linen, and an under-vest either of thin flannel, thin knitted wool, or corrugated cotton according to their respective tastes ; and the petty-officers and seamen wore the summer uniform of white cotton, and an under-vest of flannel like that worn in winter. Besides these, from high officers down to seamen, each was provided with a cloth over-coat, and a water-proof, which were to be used for protection against cold and wet. For head gear, they generally used a round cap of blue-cloth. During the summer, it was covered with a white covering. And when going out in the hottest season, the officers and warrant officers wore a white helmet. During the voyage on the Formosan Sea the use of straw hats was specially permitted ; and the petty-officers, seamen and stokers used hats made of the leaves of palm-tree. The best cap for protection against heat during the summer was found to be one made of straw, or the leaves of the palm-tree. Covering the cap with white cloth was perfectly useless against heat.

In the report furnished by S. Iwasaki, Surgeon of the Defence Mine Station at the Pescadores, will be found the result of an experiment made on the ilands at the hottest time June 26th, 1895, to determine the relative value of different kinds of caps.

On June 26th, the weather was bright, and the heat was severe, the thermometer standing at 88° F. in the shade. A thermometer experiment was made a little after noon on various kinds of caps, with a view of ascertaining which cap was best suited for avoiding heat. The place of experiment was the yard on the south side of the barracks in the Sokuten Isle ; and that the thermometer might be well covered by each kind of cap, a round aneroid barometer with a thermometer affixed was made use of. The experiment continued for an hour, and the result was as follows :—

The helmet of officers	98° F.
The blue cloth cap of officers	100° F.
The same covered with white cloth	100° F.
The palm-tree leaf hat of seamen	96° F.
The ordinary straw hat	95.5° F.
The thermometer exposed at the same hour in full sunshine without covering	112° F.

In the winter of the year 1894, during the encampment in the North China sea, the following extra articles of clothing were specially provided for the severe cold.

Article.	Officers.	Petty officers and seamen.
Woollen shirt	1	1
Flannel under-drawers	1 pair	2 pairs
Hanging cloth for cap	—	1
Woollen comforter	1	1
Woollen gloves	1 pair	2 pairs
Woollen stockings	2 pairs	2 pairs
Boots	—	1 pair

These articles for the prevention of cold were found especially useful for petty-officers and seamen. Among the rest, the hanging cloth for the cap was of great use, as their overcoat had no hood, and many reports agree that the unexpected scarcity of frost-bite among the men was greatly due to the use of the hanging cloth of the cap, and of gloves. Thus we see that the severe cold of the north was satisfactorily combated by the regular as well as by the extra articles of clothing. Also during the severest winter season, not only officers and warrant-officers but petty officers and seamen were allowed to wear those extra articles of clothing which they found needful ; and again on the ship they had permission to wear Chinese shoes. All these articles were found very useful in cold weather. We find from the reports of petty officers and seamen that some slight alterations in clothing might prove of great benefit ; for instance the overcoats, some of which are too short to reach the knee, should be made a little longer, and also all be provided with a hood. The flannel shirt for winter-use should have its sleeves made longer, and a thin flannel shirt should be provided for summer use, and the water-proof coat which is of too coarse a material should be made of better stuff. There were some complaints of the length of the boots which came up too high to the knee and proved troublesome when working, and wishes were expressed that gloves should be of a better material. Lastly, the working garments being of hemp, easily absorb the heat of the sun and fire, and were not good for those who work near the fire as stokers. Our opinion is that, though cotton cloth is somewhat inferior in point of durability, *Kokura* cotton would be a good substitute. We found from experience that the severity of burns greatly depends upon the fabric of the clothing. At the battle of the Yellow sea, many cases of burns occurred on the Matsushima and it was found that, the burns were much more severe with those who wore woollen clothes, than with those who were in working-garments of hemp; this was because the woollen clothes caught fire more easily than the hemp.

The report by K. Ogizawa Chief Surgeon of the Matsushima says :—

It came under our personal observation that the severity of burns depends on the material of clothing worn. At the time of the Yellow sea battle, some of our men wore working garments of hemp, while others those made of serge ; and the latter had more severe burns than the former. This shows that woollen clothes catch fire more easily than those of hemp.

The bedding of petty officers and seamen consisted, according to the regulations, of three blankets, one of which was to be laid under, and the other two were to be used as covering. However, during the severest cold, almost every ship provided every man with two extra blankets, so that every one had really five blankets. During the war, on many occasions hammocks were not used, as when they were preparing for fighting, or on reconnoitre, or sentinel duty, etc. On such occasions, the men slept on deck, on sails with blankets under them and blankets for covering. On some ships (the Itsukushima and others), two men were made to sleep together, so that ten blankets could be used in common, four of which were laid beneath with six blankets for covering. And, for emergency, they were ordered to sleep with all their garments on but the coat.

4.—CLEANING.

Bathing:—Method and frequency of bathing were not the same with all ships, but differed, as men's works, and ship's constructions differ, for while some ships had no bath-room, others had many. Hence with some ships, the men took a bath once or twice a week, while in others they took them only once or twice a month. It is true that members of the engineering department always took a bath when going off duty; and naturally after any particularly dirty work, such as taking in coals, they washed themselves at the stokers' bath-room. In ships generally, there are two bath-rooms, that is, the officers' and the stokers' bath-room; and petty officers and seamen were made to bathe at the stokers' bath-room, or in the bathing-tub made of canvas and set on the upper deck. In gun-boats like the Amagi, there was no bath-room, and in such ships a copper-punt filled with sea-water took the place of a bathing-tub. In most ships, sea-water with steam sent through it was used for bathing, and fresh water was only allowed for clean-washing after bathing. In certain ships, even this allowance of fresh water was curtailed owing to its scarcity. Generally speaking, in large ships which had a bath-room completely furnished, as well as an ample quantity of distilled water, officers and warrant officers took their bath as often as they pleased. In summer-time when a warm bath was not needed, a cold sea-water bath was often taken; or if a heavy shower came on, they disported themselves on deck in nature's costume. At the beginning of the war, bathings were naturally insufficient, and probably owing to this, we had more cases of boils, eczema, sudamina, ringworm, chloasma, sore-toes, etc., than in ordinary years.

Washing and airing of clothing and hammocks :—This was not very effectually done previous to the battle of the Yellow sea, as the men were continually on guard, but after the decisive battle, the keeping guard being relaxed, such ships as had ample resources of distilled water were able to let their men wash their garments once a week; whereas in others where the supply of distilled water was so poor that they had only just enough with which to wash their faces, they could only wash their clothes when it rained or when a transport brought them fresh water, consequently the clothes were only washed two or three times a month. With regard to bedding the only time possible was when men could land, and found suitable water, so probably the bedding was not washed more than once or twice, during the whole war. Hammocks were sometimes aired on bright sunny days, but at the beginning of the war, when the men were very busy it was impossible to air them frequently.

Washing and drying of decks :—The washing of decks was divided into two classes, the washing of the upper and of the lower decks. According to regulations the former was done every morning, and the latter twice a week; and the lower decks were to be washed with fresh water. During the war, the washing of the lower decks had often to be dispensed with owing to the want of fresh water, as well as pressure of work. Especially during the winter time when the sea-water pouring over the upper decks directly froze, the washing could only be performed on a bright warm day, and not as often as regulated. With regard to drying after the decks had been washed, the lower decks were wiped with hot water, and then dried by air sent through wind-sails, or by drying stoves. After a rain-fall, the lower berths were ventilated by letting air through the open scuttles and wind-sails, after the wet things had been taken on the upper decks.

5.—WARMING OF WARD-ROOMS, GUN-ROOMS, ETC.

Stoves were provided in most ships. In two or three ships as the Yoshino and Naniwa, the cabin, ward-room, and gun-room were each furnished with a steam-heater, so that no stove was required, but where there was no heating apparatus, stoves were used, and also fire braziers. The gas and smoke from the stove was conducted through the chimney on the upper deck or the scuttles, but as this was impossible with the fire-braziers, carbon dioxide was liable to accumulate, and therefore great care was taken in ventilation by opening and shutting the scuttles and hatches. If fire-braziers are used, and care is paid to ventilation they are perfectly harmless, but with insufficient ventilation poisoning from carbonic acid gas is liable to occur. According to the reports on the present war, fire-braziers were much used besides stoves, but owing to strict observance of ventilation as well as of the hours in which the fire was kept alive—that is, from the time of rising to going to bed—poisoning was almost completely avoided. The only case of poisoning occurred on the Hashidate. On the night of January 4th, 1895, in order to melt the oil of a torpedo-machine that had frozen, fire was kept alive in braziers in the fore torpedo-room of the lowest deck, and on this occasion those who slept in the room were poisoned with the carbon dioxide thus produced.

The report of T. Shikano, Assistant Surgeon of the Hashidate states: On January 4th, 1895, our ship lay at anchor off Wei-hai-wei. The night being extremely cold, the oil of the torpedo machines froze, and with a view to melting it, the torpedo lieutenant ordered a fire brazier to be placed in each torpedo-room, fore and aft. About 12 o'clock in the night, one of the men sleeping in the fore torpedo-room was roused to go on watch, no sooner was he on the upper deck than he fell down. I went directly and examined him, when he complained that he had a very severe headache, and had once vomited a short while before. On inspecting the room where he had been sleeping, I saw that there was a brazier with a big fire with all the scuttles shut, and the room filled with a peculiar smell. So immediately the scuttles were opened to let in the fresh air, and all the inmates of the room, twelve in number were roused. Of these twelve persons, one fell down after a few steps, and another when he came upon the lower deck. These three had their clothes unfastened and were given artificial respiration, and thus they came round in a few minutes. Thereupon, they were placed in hammocks in the lower deck. Meanwhile, nurses and corporals were ordered to go and awake those who were sleeping in the torpedo-room aft and they were now removed to the lower deck. In this room, none were affected by the poison; this probably was due to the fact that the fire was not so intense there. The aforesaid three persons received medical care for headache, but all recovered in a few days, without feeling any after-effects.

In this way, for want of the means of conducting the gas, the fire-brazier is dangerous, if suitable care be not taken for ventilation; and it is of course far better to use a stove if it can conveniently be provided. That little injury was caused by the fire-braziers was due to the fact that during the day-time when they were used, some scuttles and hatches were left open.

Concerning the warming of rooms, a few reports stated that it was injurious, for one had to expose oneself to sudden changes from warmth to cold, and vice versa, which made the men more liable to catch cold and to be frost bitten. But most reports were in favour of warming apparatus from practical observation: warming oneself in a room gives alacrity to one's work in a time of benumbing cold, and recreates one in exhaustion; and the warmth made the decks dry after rain and snow, which was a great preventive to catching cold; it also promoted ventilation.

6.—PREVENTION OF INFECTIOUS DISEASES.

As the first means of preventing infectious diseases, as before stated, vaccination was strictly carried out on those with whom full five years had elapsed since the last vaccination. Again, as the attacks of various infectious diseases chiefly come from the use of water and raw articles of food, great attention was paid to this point, and during the summer—especially when cholera, dysentery, and enteric fever were prevailing, the men were forbidden to take any raw food or unboiled water. When transports in harbour were visited by cholera, all the ships were strictly prohibited from holding intercourse with them, and for fear that the sea-water should contain the virus, its use in almost every way forbidden,—that is, in cleaning food and utensils, and also in washing the decks, and in taking sea-water baths. At the time of the prevalence of cholera on land, it was forbidden to obtain food anywhere in that district, and as the mail-matters might possibly have passed through the district they were exposed in the sun for a whole day before being opened, or sometimes disinfected by means of steam.

As regards the use of medicines for prevention of malarial fever, during the northern expedition, they were used when seamen and coolies at the station of Longreach, Korea, were attacked with the disease. In the Korean sea, especially in Chemulpo, this disease makes an occasional appearance, and consequently for its prevention quinine was sometimes given. But the use of quinine as a preventive measure was generally speaking restricted. But during the expedition to the

Southern Sea, where Formosa and islands in the vicinity are a haunt of malarial fever, it was necessary to take preventive measures, and therefore on the day previous to our fleet's approach to the Pescadores, the Flagship gave a signal to all ships under command that quinine should be used as a preventive of the fever. Under the order, every ship administered a uniform dose of the drug—that is, 0.25 gramme once a day—to every one. This was likewise done when the fleet was approaching Formosa. The routine of administering quinine was as follows: for a day previous to a ship's arrival at a malarial district and a week after, or during the time when she had to lie at anchor within one mile from the shore, or when her members were to land, or during the wet and rainy season. Whether or not the use of quinine had any effect, is not well ascertained, but from the reports furnished by all surgeons belonging to the fleet, we will now quote what we consider to be interesting and instructive.

(1) Among the natives of Longreach on the southern coast of Korea, where our Chief Naval Station in the front was established, intermittent fever (especially quartan) prevails, and some of our men and coolies were affected with it, while they were encamping there. Hereupon, sulphate of quinine was daily given to every man in the service for a month, with the favorable result of its entire cessation among our men. (By Surgeon Kuwabara belonging to the Station).

(2) The port of Chemulpo, Korea, has been called a malarial district. For a month, from the end of May, 1894, to the end of the next month, our ship was at anchor in the port, and at that time, the disease having broken out among the inhabitants of the port, members of our ship were necessarily given a dose of quinine previous to landing, and not a person was attacked with the disease. (By Tomimatsu, Surgeon of the Yamato.)

(3) The mouth of the Tamsui River, Formosa, is a very unhealthy district, and abounds in malarial diseases. However, our ship lay at anchor at this place in summer for a long time, without having any one of our members attacked with the disease, owing to the use of quinine as a preventive. (By Okamoto, Surgeon of the Oshima.)

(4) During our ship's expedition to the coasts of Korea and China, we had

no need for the use of quinine, but in April and May, 1895, when she happened to hug the coast of Formosa, we administered quinine to each member of the ship before he went to bed, and at the same time had every scuttle and hatch closed during the night. There occurred some cases of sudden rise of body temperature, which, however, disappeared in a few days, and none of them could properly be called cases of malaria. (By Wakaguri, Surgeon of the Chiyoda.)

(5) When our ship was at Formosa, we gave a daily dose of 0.4 of quinine from the day previous to her arrival at the island, which was continued for two weeks. But even after that period, those who had to land were made to take a dose beforehand, and those who had to pass a night or nights on land were to carry with them a certain quantity of quinine and also drinking-water. In spite of such continuous use of the quinine, no injury to the stomach was found, nor was any person affected with the disease. Whether this favorable phenomenon was due to the use of quinine, or to the non-use of the water on land for drinking purposes is not ascertained. At any rate, it is evident that if we avoid drinking the water at an unhealthy district, attended with the use of quinine, the disease can be prevented. (By Ōta, Surgeon of the Matsushima.)

(6) On arrival at Keelung port of Formosa, on June 7th, 1895, quinine was given as a preventive for a week, and then it was stopped. After a week, a case of intermittent fever occurred, and during our stay at Bakun harbour of the Pescadores in August the same year, we had also some cases of intermittent and remittent fevers. (By Maki, Surgeon of the Akitsushima.)

(7) During the northern expedition, we found no need for the use of a preventive against intermittent fever. However, whenever, owing to the dampness of the air, there was a great difference in temperature between day and night, or when the country where the ship's members had to land was known to be unhealthy, those who manned the boat, and those going ashore were given quinine as a preventive. Yet we were not totally free from the disease, two or three malarial cases appearing among the ship's company. (By Assistant Surgeon Shikano of the Hashidate.)

(8) By order of the Flag-ship, we gave quinine to each member of our crew for a week from the day preceding our arrival at Keelung port, Formosa; and those who landed, or approached the shore like the boat-men were obliged to take the medicine. We had a remarkable experience about malarial fever in the course of our ship's stay there. As above stated, in our ship every person who had to land or to

approach the shore never failed to take quinine, and the result was that no case of malarial fever had occurred in the ship. However, during her stay at Keelung, one day our steam-boat (our ship was anchoring off the shore) encountering a sudden storm, was compelled to take refuge in a deep cove, without having time to call at the ship for quinine, and dropped her anchor close by the shore as usual. As a result' three days after, a member of the boat was attacked with fever, which was cured in the course of five days by the use of quinine. (By Saito, Surgeon of the Yoshino.)

(9) During a short period from the end of October, 1895 to the beginning of November, no fewer than 20 cases of malarial fever at once occurred in our ship. This was with the seamen who had advanced on the Taiheizan fortresses, when the Takau forts of Formosa were occupied, and also with those seamen who had waded across the ditches around the forts of Anping, when it was taken possession of, more cases occurring among the former class of men (these persons according to the regulations of the ship had taken a dose of quinine previous to landing, and also carried with them three days' quantity of the medicine which they used during their stay on land). Mount Taiheh is a peak towering north of Takau port with a fort at about eight-tenths height from the foot. At about 1,400 or 1,500 metres above the shore, there is a spring on the mountain side, whose water is fresh and sparkling. The landing party of our ship who were then ordered to take the fortresses there had used up all the water they took with them on the way, and had to drink of the spring-water. This was the chief cause of the above mentioned visitation of malarial fever. Anyhow, the character of the disease then was very weak, each case being cured after running a short course by use of quinine. (By Saito, Surgeon of the Yoshino.)

From the above reports, it is evident that quinine is an effective medicine as preventive against malaria (as the 1st and 5th reports show), but we must say that there sometimes occur cases which defy the power of medicine (as the 7th and 9th reports state). How many days the medicine holds its power over the person after its use, is not ascertained, yet we may safely say that the effect does not last long (as the 6th and 8th reports tell), and even during the use of quinine, one can not withstand the attack of malaria, when exposed to a strong virus of the disease (as the 9th report shows.)

7.—RECREATIONS.

During the expedition, in order to rouse the spirit of the ship's members, and to relieve them from tedium, as many modes of amusements as possible were chosen. On holidays and festivals, the amusements of fencing, sword-dance, wrestling, *jujitsu*, war-stories, martial-songs and chivalrous speeches etc., were indulged in; and during recesses on ordinary days, the plays of chess, *go*, cards, flute, harp, and ring-throwing etc., were allowed to be made. In the evening, canteens where spirits, confectionery, tobacco, and sundry other articles were sold, being in the ship, the men were permitted to buy there whatever they liked. The canteen was established with funds which were contributed by each member of the ship. With this fund, various articles of food, drink, and other daily needs having been bought in and stored by the canteen, each might buy whatever he liked at it. Among these articles, spirits were only allowed to be bought within a fixed quantity, with Japanese *sake* the maximum being 12 oz. Of all the means of giving pleasure, the canteen was one that proved the most enjoyable. After a day's toil in the hottest season, a glass of wine which a seaman drank off on the deck with a cool refreshing breeze blowing, made him forget the hardness of the day's work; and a cup of warmed *sake* on a cold evening could well change the night into a wink of sweet sleep. Again, chatting about the quality, prices, and the like of various articles of daily need shown on view at the canteen was another cause of indescribable pleasure to them. Moreover, many kinds of articles of food and drink, and of other daily need, and books, newspapers, and magazines etc., which were presented by benevolent people throughout the Empire were extremely grateful to these brave and patriotic men. Among the rest, the gracious words of sympathy and precious gifts which

Their Majesties the Emperor and Empress condescended to give them from time to time, roused them to enthusiasm, so much so that pleasure and pain of their own, and the anxiety about their families were really nothing before the loyal and patriotic ardour thus inspired. In these ways, though the crews were not allowed during the expedition to go on shore, not even once in many months, and at the same time mental pleasure could not he sufficiently taken, yet no visible injury was done to the general health of the men, the only phenomenon that was remarked was this that they were inclined to be somewhat excitable from slight causes.

CHAPTER IX.

WORK IN THE NAVAL HOSPITALS.

At the beginning of June, 1894, the serious insurrection which broke out in Korea, precipitated into a diplomatic question between Japan and China, and as the negotiations between the embassies of the two Powers seemed to fail to arrive at a compromise, our Navy lost no time in commencing preparations for war. The Naval station of Sasebo had been selected as the Naval Headquarters, as it was the harbour nearest the enemy and would accordingly prove most convenient for the ins and outs of our vessels, the transportation of armaments and provisions, and the reception of patients. On the 6th of the same month, Yasuzumi Saneyoshi, Director General of the Navy Medical Bureau, telegraphed instructions to the chief of the Hospital of every Port Admiralty and especially to that of Sasebo Admiralty in regard to the supply of medical outfits, and the preparation for receiving the sick and wounded. It was the scheme of the Medical Bureau that the sick and wounded from the battle-fields should first be conveyed to the Sasebo Hospital by transports, and that afterwards the cases requiring slight care, or convalescing which could bear conveyance should be transferred either to the Kure or the Yokosuka Hospital according to the Admiralty to which they belonged. At the Sasebo Hospital, the medical provisions for the use of the hospital, the expedition squadron and the torpedo flotillas of Sasebo and Tsushima were sufficiently provided. The number of the sick and wounded was computed at 1,000 which was one-tenth of the estimated total number of persons (10,000) comprising the men on board the warships, and of the Sasebo and Tsushima torpedo flotillas, as well as those belonging to the transports, despatch vessels and ships undergoing repairs. Thus, 350 beds which were to accommodate about one-third of the supposed number of the patients were provided at first in the wards and newly constructed temporary wards of the Hospital, the rest to be furnished as requirements arose out of the war. And at the Hospitals of Kure and Yokosuka, surgical outfits as well as the medicines to be used therein and to be supplied to the warships and other vessels, were also provided in amounts sufficient for one year's demand, and 178 beds in the Kure Hospital and 160 beds in the Yokosuka Hospital were ready to receive patients.

The above arrangements were promptly carried out in each Naval Hospital, and there was nothing to be complained of in the reception and treatment of the sick and wounded, and of the medical supply at the time of the first battle of Phung-do.

1.—THE NAVAL HOSPITAL OF THE SASEBO PORT ADMIRALTY.

On July 25th, the Naval battle near Phung-do was fought; in this engagement none of our men were killed or wounded, but the Chinese transport Kowshing being sunk by the fire of our cruiser Naniwa, two Englishmen and one Spaniard who were on board that vessel, were saved by our boats, and were escorted, together with the Chinese officers and crew, numbering more than eighty, of the captured Chinese ship Tsao-kiang, to Sasebo by our despatch vessel Yayeyama. The Spaniard had a perforating gun-shot wound on the neck, which was inflicted by some Chinese soldiers while he was deserting the transport. Some men among the captives of the

Tsao-kiang were suffering from sickness. The Englishmen and the Spaniard were received into the Sasebo Naval Hospital where they were kindly attended to as guests, and the Chinese captives were kept in the special apartments of the Sasebo Naval Prison adjoining the Hospital, where our medical staff recognizing the great principles of humanity, paid them every attention.

On September 17th, there took place the battle of the Yalu. In this engagement the total number of the killed and wounded on board our ships was 298, the largest number being on the Matsushima which also received very serious damage to her hull, so that after the termination of the engagement she had to steam back for repairs and arrived at Sasebo on the 20th of the same month. Of the wounded on board that ship, serious cases numbering 42 were admitted into the Sasebo Naval Hospital on the same day, and also 66 cases of the wounded on board the other ships of the squadron were sent back to Sasebo on board the transport Genkaimaru, and received at the same Hospital on the 21st of the same month.

In February of the year 1895, several attacks were made on Wei-hai-wei; the total number of the killed or wounded in these engagements was 66, of which the seriously wounded cases were first received in the Navy Hospital ship Kobe-maru at the place of battle, and after the capture of Wei-hai-wei, that Hospital ship returning to Sasebo, 14 cases of wounded in action were transferred to the Sasebo Naval Hospital together with the cases of diseases.

On March 23rd, the attack of the Pescadores was successfully made; on this occasion, one man of the squadron and about thirty men of the Army were wounded, of whom the one belonging to the Navy was received in the hospital ship Kobe-maru, and the twenty two wounded of the Army were received on the Saikyo-maru, where they were respectively treated, and afterwards transferred to the Sasebo Naval Hospital by the transport Bankoku-maru.

The number of cases wounded in the battles and admitted to the Sasebo Naval Hospital was 145, and the number of other kinds of patients (the wounded by accidents not in combat, and those affected with diseases) admitted to the Hospital during the course of the war (July 1st, 1894, to December 31st, 1895) was 1,416.

The ordinary staff of the Sasebo Naval Hospital consisted of five surgeons, one pharmaceutist, and 30 sick berth attendants and assistants, but to meet the emergencies of the war, the number of surgeons, sick berth attendants and employés etc., had been increased. Even so, however, just after the battle of the Yalu, every one attached to the hospital was exceedingly busy as more than 100 wounded were admitted to the Hospital at once and as there were many cases of injuries of the gravest kind, such as extensive burns, which required many hours in changing dressings. So they were compelled to increase the number of the temporary employés and to have them assist the sick berth attendants. At this time of need, great help was given by Madame Shibayama, wife of the Commander in Chief of the Sasebo Port Admiralty, and many other ladies, wives and daughters of naval officers, in preparing the bandages and caring for the patients. After that time, not a few of the ladies of the naval officers' families, as well as those of the towns and villages, applied for permission to nurse the patients in the Hospital, and the Red Cross Society of Japan notified that its nurses might be employed in the relief of the wounded. But by this time, the arrangements for the relief of the patients were already sufficient, so that there was no necessity to call for help from outside benefactors.

2.—THE HOSPITAL OF THE KURE PORT ADMIRALTY.

Of the wounded men in battle, one was sent straight to this Hospital and thirty-six were transferred from the Sasebo Naval Hospital, numbering thirty-seven in all; the wounded by accidents and the sufferers from diseases, admitted to the Hospital in the course of the war, were 1,067 in number. The medical department of this Hospital consisted of six surgeons, one pharmaceutist and 38 sick berth attendants and assistants. The number of the wounded received in the Hospital was small and few of them were serious, so the staff did not feel very busy. However, when the wounded were admitted to the Hospital, useful assistance in nursing was rendered by the Volunteer Ladies' Nursing Society of that locality. Let us say a word about the history of the Society. The *Aiseisha* (Society of humanity) is an association organized about ten years ago by the ladies of the naval medical officers with a view to training themselves in the art of nursing the sick and wounded, and of offering benevolent service on occasion of war. The project of the Society had the cordial approval of Madame Arichi, wife of the Commander-in-Chief of this Port Admiralty, and by her influence, many ladies of the port joined, and gave their best assistance. Thus the branch of the above mentioned nursing society was newly organized at this port just after the declaration of the war, and then the wives and daughters of the petty officers and seamen were invited to join them. They were engaged every day in the art of nursing the wounded and the sick. The number of members was no less than 174 by the end. When the wounded were received into the Hospital, the members were allowed by daily turns to attend the Hospital, 15 each day and to serve there from 8 a.m. till the noon in the changing of bandages and the preparation of dressing materials. On March 30th, 1895, H. M. the Empress paid a visit to the Hospital, and on her way to the wards, all the members of the Nursing Society were presented to Her Majesty, and a gift was given to the Society by Her Majesty the Empress. Madame Arichi, President of the Society, intending to keep this remarkable honour in remembrance for ever, made silver clasps, whereon were stamped a Holy Hawk holding a paper note with the words The Nursing Society and distributed them to all the members. The glory of the members is as bright as the silver medals worn on their breast!

3.—THE HOSPITAL OF THE YOKOSUKA PORT ADMIRALTY.

Yokosuka lies at the remotest situation from the battle-fields, and accordingly the wounded combatants received in the hospital were only two, transferred here from the Sasebo Naval Hospital, the sick and wounded (not in the action) only numbering 682 in all. The medical staff of this hospital consisted of nine surgeons, two pharmaceutists, and 45 sick berth attendants and assistants, and their work was slack compared with that of the other naval hospitals.

4.—THE HOSPITAL SHIP.

On August 14th, 1894, the Kōbe-maru, a steamer of the *Nippon Yusen Kaisha* (the Japan Mail Ship Co.) was newly chartered to serve for the purpose of a Navy Hospital Ship. In the Nagasaki dockyard, she was properly equipped and her interior was modified so as to provide wards for the surgical, medical, infectious, and the insane cases, a disinfection room, an operating theatre and a laboratory, etc. The medical staff on board the ship was organized with three surgeons, three surgeon probationers, one pharmaceutist, and nine sick berth attendants and assistants. On the 31st of the same month, she left

Nagasaki for Longreach, Korea, the rendezvous of our expedition squadron at that time, and after this she constantly followed the track of the squadron, receiving and treating the sick and wounded, not only from the Navy but also some from the Army. When she started on the southern expedition in March 1895, thirty hired sick berth attendants were added to her staff. At the end of the month when she had arrived at the Pescadores, there broke out an epidemic of cholera in a transport belonging to the Army, which immediately spread among the soldiers landed on the islands. So, isolation hospitals were constructed at the towns of Riseikaku and Makun on the islands, and naval surgeons, sick berth attendants, etc., from the squadron and transports, worked ardently for the relief of the patients, yet the sufferers increased greatly in number every day, and the want of medical aid was keenly felt. During this emergency, the surgeons on board this hospital ship landed with sick berth attendants and gave their services, and later on, thirty six additional sick berth attendants were temporarily hired, and employed in tending the sufferers on board the ship as well as on the land. From the outbreak of the cholera on the islands till its disappearance, the total number of cases was 1,922, of which only three were seamen of the Navy, all the rest were soldiers and coolies belonging to the Army. During the course of the expedition (August 1894 to August 1895), the total number of patients received in the ship was 696, of whom ninety were men wounded in actions of the Navy and Army, one was a Chinese captive wounded in the battle of the Pescadores, and the remaining 605 were sick and wounded otherwise than in action. It was a matter of great regret that she could not discharge her most important duty during the engagement of the Yalu, as, just at the time, she was stationed in the base of Longreach far distant from the scene of the battle.

The above mentioned wounded captive was found by Director General Saneyoshi, of the Navy Medical Bureau, while he was, after the fall of the Pascadores, inspecting the sanitary conditions of Makun town. The captive was lying prostrate on the ground suffering from a perforating wound on the chest; he was taken on board the ship and after treatment, had the happiness of returning home completely recovered. Previous to this incident, at the time of the fall of Wei-hai-wei, this ship was privately ordered by the Chief Commander of our squadron to receive about seventy wounded Chinese found in the Peyang Hospital in Luikung Island. While arrangements were being made these patients petitioned to be sent back to their native home together with other captives; so the preparations were stopped midway: but we may say that it was the constant aim of our Naval authorities to see that the principles of humanity were maintained in regard to the wounded and the sick.

The ship had numerous wards on upper, main, and lower decks, with the view to receiving 200 patients at one time. However, during the war, more than 20 transports in the service of the Navy were constantly plying between the fields of battle and home, so that there existed great facilities for transportation as well as communication. Thus, patients who could bear transportation, being from time to time sent home, the maximum number of patients in the ship at one time, was never more than fifty eight and mostly far less. Accordingly, the wards on the upper and main decks proved sufficient for the purpose, and those on the lower deck which were rather inconveniently situated for the treatment of patients were never used.

5.—THE HOSPITAL AT THE EXPEDITION BASE.

In July 1894, the Regulations for the Expedition Base were promulgated, and on the 21st of the same month, the officers were appointed; as members of the hospital, four surgeons, with six sick berth attendants and assistants, were appointed. On August 13th, Longreach in Korea having been selected as the place suitable for the base, a barrack hospital was constructed, and provisions were made to accommodate about thirty cases should such occur among the officers and men serving at the base and on board the warships. Besides, numerous tents were provisionally furnished in order to afford relief to the coolies and workmen belonging to the Base station. In November, when Port Arthur was occupied by our Army and Navy, that harbour was determined on as a new base, the base at Longreach was abandoned, and all the members of the hospital there left for Sasebo and arrived at their destination on December 19th.

The total number of the patients received in this hospital while it was open was 338, of whom 52 were combatants, and the remaining 281 non-combatants, the majority being coolies. During the summer month, dysentery prevailed to a certain degree, but fortunately it died out without doing much havoc.

6.—THE BASE HOSPITAL AT PORT ARTHUR.

In November 1894, Port Arthur was captured by the Second Division of the Army and the Navy, and on the 29th of the same month, the port was proclaimed as the Naval Expedition Base, and on the 5th of the next month, the officers were appointed, the staff of the hospital being four surgeons, one pharmaceutist, twenty three sick berth attendants and assistants. Soon after their appointments, the medical members met together at the Sasebo Port Admiralty to consult about various preparations required for the establishment of the hospital. The Chief of the Hospital went over to Port Arthur earlier than the other members together with the Chief Commander of the

Base, and after inspecting the place he formed a plan for carrying out all sanitary measures and the design of the hospital now to be established. The other members arrived at the place of their appointment, the earliest on the 31st of the same month and the latest on January 25th of the next year. A part of the public buildings belonging to the Chinese Navy was appropriated for the hospital, and wards for medical and surgical cases, isolation wards for infectious diseases, etc., provided, with other provisions required for admitting about fifty patients. It was opened on January 21st. In this hospital, special accommodations had been made for the wounded in battle, but from this time on there occurred no naval fight severe enough to produce the wounded, except the bombardment of Wei-hai-wei. The wounded at the battle of Wei-hai-wei were directly conveyed to the Sasebo Naval Hospital by the hospital ship Kobe-maru, so the patients received in this hospital were cases suffering from diseases and injured by accidents with the Naval parties at Port Arthur and Talienwan, and on the vessels of the Squadron. Of these the chronic cases were sent to the Sasebo or Kure Naval Hospital by transports ; so the want of beds was never felt in this hospital. It was only during the prevalence of cholera that the members of the hospital were very busy as they had to work at measures of prevention and disinfection. The epidemic broke out at the middle of April, 1895, raged during the months of June and July, and, diminishing by the end of August, entirely disappeared at the end of September. The total number of the infected was 462, nearly all being officers, soldiers, and coolies belonging to the Army; in the Navy only four persons fell victims to it. Two surgeons were sent from this hospital as quarantine officers and they served in the business of inspection and disinfection along with the officers depatched from other quarters.

On November 14th, an order was received that preparations should be made for withdrawal from this expedition base and for returning to Sasebo Port Admiralty. They were directly begun, and leaving Port Arthur on December 16th, all the members returned to Sasebo.

The patients admitted to this hospital from its opening till its closing amounted to 389, and, besides, it had treated 71 combatants and 3,585 non-combatants as outpatients.

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We believe it to be our proper duty as Japanese subjects, to make special mention of the great kindness of our most revered and benevolent Empress. Her Majesty has always taken and still takes the liveliest interest in all matters of charity and benevolence. Many organizations of charity, such as hospitals, orphanages, etc., have been greatly promoted under Her generous influence, and not a few institutions of this kind are under Her Majesty's patronage. From the very inception of the China-Japan war, Her Majesty showed a great sympathy for the sufferings of the wounded, and so deigned to prepare bandages for them in the Palace assisted by the chambermaids, the bandages being presented to hospitals, squadrons, and companies. Men who had lost eyes or limbs on service, were favoured by gifts of artificial eye or limbs from Her Majesty. The wounded forgot their sufferings in their gratitude, and the officers and men were generally inflamed by a spirit of exalted loyalty.

Another matter to be mentioned lastly is the fact, that throughout the war the sanitary conditions of our Navy was unusually good. From July 25th, 1894, to November 17th, 1895, there occurred 6,050 cases of ordinary diseases and injuries (the wounded in combat excluded), showing an average daily rate of 12.578 new cases while the average daily number of total force was 14,260 and among this number are included those who never went off duty on account of the slightness of their illness. If we counted only the sick who were obliged to be temporarily out of service, we should see a remarkable decrease in the number. And if the number of days sickness be proportioned to each case, the average ratio will be 36.03. Compared with that of an ordinary year (the average rate of the preceding five years), in which the average ratio in each case was 32.72 which is only an increase of 3.31. Again, the total number of deaths that occurred during sixteen months of the war was 172, which gives a ratio of 12 per 1,000 of the force. If we subtract from the above number 29 drowned and 2 suicides, the former of which should be regarded as an unavoidable accident, the number of deaths from actual diseases was 141, showing a ratio of 9.88 per 1,000 of the force.

Such being the sanitary conditions of the Navy, no need was felt at any hospital or on board any vessel, for increasing the medical staff, or calling for assistance from other quarters, except at the Sasebo Naval Hospital which at one time was crowded by a large number of the wounded in combat and was compelled temporarily to increase the number of surgeons and employés, and in the hospital ship on the southern expedition, when she had to hire temporary sick berth attendants.

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